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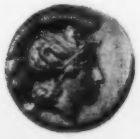
London · New York  *Paris · Los Angeles*

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ÉTUDE DES RÉPERCUSSIONS INTESTINALES DE L'ÉMOTION PAR LA SIGMOIDOGRAPHIE*

C. QUARTI, M.D., J. RENAUD, M.D., et CH. DEBRAY, M.D.

INTRODUCTION

LES émotions représentent autant de phases paroxystiques émaillant le rythme des corrélations entre la vie de l'esprit et celle de l'organisme (COBB, 1950). Elles sont ainsi pour nous comme un système amplificateur permettant une approche plus aisée de ces corrélations. Nous pouvons en effet étudier facilement leurs manifestations objectives: modifications du comportement, altérations des rythmes cardiaque, respiratoire etc. Et nous savons, grâce aux travaux de CANNON (1929) et de ses successeurs, que cette perturbation émotionnelle apparait à tous les niveaux, humoral, vasculaire, digestif, selon des modes enregistrables, souvent mesurables. L'émotion est donc, ainsi que nous l'avons présenté ailleurs (QUARTI et RENAUD, 1953) une véritable "unité psychosomatique." Elle sera pour nous ce qu'est pour les dermatologistes la "lésion élémentaire" qui, dans une dermatose complexe, garde les caractères non remaniés de l'affection originelle.

La première démarche en Médecine Psychosomatique consiste à distinguer l'*émotion normale* de la *pathologique*.

(1) *Normalement* l'émotion suit toujours les lois de l'homéostasie, ainsi que CANNON l'a si clairement démontré (CANNON, 1935). Les mouvements biologiques et psychologiques (BARD 1934; FREEMAN, 1948.) qu'elle provoque en l'individu s'amortissent harmonieusement, grâce à nos innombrables "systèmes compensateurs," tant organiques que mentaux. Dans sa phase psychique, par ex., l'émotion normale s'adapte aux besoins et possibilités du moment, s'amortissant plus ou moins vite, voire s'inhibant. Chacun n'a-t-il pas expérimenté qu'il est des périodes où l'on n'a pas le temps d'avoir faim; alors les sollicitations de vitrines alléchantes demeurent vaines. Quand au contraire nous avons la possibilité de nous y laisser aller, odeurs et vue de certains mets éveillent et prolongent en nous cette émotion particulière qu'est l'appétit. Ce "filtrage" automatique, grâce auquel nous sommes plus ou moins disponibles aux sollicitations affectives, est une des caractéristiques de la vie émotionnelle normale.

Il en est de même pour les manifestations objectives. On sait qu'elles sont variables selon les sujets et, pour un même sujet, selon les moments. En effet la perception émotionnelle se traduit en principe par une décharge végétative diffuse de sens sympathique (ALVAREZ, 1919; WOLFF, 1953). Mais les organes et systèmes récepteurs de cet influx seront ou non atteints par lui selon le sens de leur fonctionnement au moment de l'excitation.

Au total l'émotion normale n'est qu'un incident qui s'intègre parfaitement dans le mouvement vital de l'économie (RENAUD, 1953). Loin d'être pathogène, elle est preuve du pouvoir d'adaptation de l'organisme à tout changement de situation (SELYE et FORTIER, 1950).

(2) Il en va tout autrement de *l'émotion "anormale."* L'intensité de la secousse qu'elle constitue pour l'organisme, sa durée, le sens des perturbations neuro-végétatives qu'elle introduit ne sont plus adaptés à la stimulation qui la déclenche, pas plus qu'à l'état biologique du sujet au moment où l'émotion se produit. Un tel sujet réagit mal aux mille modifications que la vie quotidienne apporte à son ambiance, autrement dit son organisme *souffre* lors de chaque stress émotionnel (WHITEHORN, 1939; WOLFF et WOLF, 1948). La répétition ainsi trop fréquente de tels heurts neuro-végétatifs va,

* From the Gastro-Enterological Service (Prof. Ch. DEBRAY), Hôpital Bichat, Paris, France.

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en un point quelconque de l'économie, provoquer des troubles fonctionnels, et peut-être de véritables lesions, selon le mécanisme très général étudié par REILLY. A l'occasion de certaines de ces localisations nous avons discuté ailleurs des principes qui ont pu les déterminer (QUARTI et RENAUD, 1954, 1955).

Ainsi l'étude psychosomatique doit-elle procéder en deux étapes. Tout d'abord d'une manière générale nous devons savoir si l'émotion se fait normalement ou non. Mais dans ce dernier cas nous n'en avons pas pour autant la preuve que les troubles de tel malade soient de nature psychosomatique. Car en principe tout son organisme souffre de l'altération psychosomatique. Reste a savoir—et ce sera la deuxième étape—pourquoi tel organe ou tel système manifeste électivement, ou d'une manière prédominante, sa souffrance. L'étude approfondie de l'émotion normale et pathologique dans ses manifestations au niveau de tous les domaines de l'économie nous aidera peut-être à résoudre ce problème essentiel.

Le but de ce travail est de donner les premiers résultats de *recherches faites* sous le *contrôle de l'enregistrement graphique des mouvements intestinaux au cours de l'émotion chez des sujets constipés* et ne présentant naturellement aucune lésion organique du colon, ni endoscopique ni radiologique.

Quant au *psychisme de ces sujets*, nous insistons sur le fait que les deux cas examinés dans ce travail ne sont pas des malades mentaux. (On a en effet signalé les troubles du transit observés au cours de certaines psychopathies. Mais dans ce cas la discussion est ouverte pour décider si les troubles somatiques de ces malades sont dus à leur maladie mentale, selon une physiopathologie psychosomatique, ou si un même trouble organo-fonctionnel (non encore deecelé) est responsable à la fois des divers troubles somatiques et de l'altération mentale). Les malades sur lesquels nous discuterons ici ne sont en rien des aliénés. Le premier cas présente tout au-plus un trouble isolé de l'émotion, trouble passant inaperçu à l'examen médical général, et qui nécessite, pour être mis en évidence, une étude soigneuse tant du rythme émotionnel que du schéma de déroulement de l'accident émotionnel. Le second cas est celui d'une névrosée. C'est à dire qu'il s'agit d'une malade que se présente dès l'abord comme un peu anormale, "nerveuse," sans qu'on puisse pour autant songer pour elle à un traitement asilaire. En effet la névrose apparaît comme un trouble fonctionnel d'un esprit dont l'architecture fondamentale reste normale. L'origine organique (métabolique) ou purement psychologique des névroses est encore discutée, et le sera probablement pour chaque cas. Toutefois, constitué, le tableau de la névrose représente un cercle vicieux dans lequel les facteurs psychiques ont un retentissement fâcheux sur l'organisme, qui à son tour peut participer au mauvais fonctionnement psychique. Ainsi peut-on admettre d'une manière générale que chez les névroses, au contraire de ce qu'on trouve chez les psychopathes, les troubles somatiques observés relèvent tout au plus d'une origine mixte.

L'intestin participe, comme probablement tous les organes, au mouvement émotionnel. C'est un fait d'expérience courante, et sur lequel certains auteurs ont déjà travaillé. ALMY, KERN, et TULIN ont étudié la motricité sigmoïde grâce au cologramme sous divers stress qu'ils qualifient d'émotionnels (ALMY *et al.*, 1947). Il s'agit de douleurs provoquées par le refroidissement des mains et la compression de la tête dans un étroit bandeau de cuir, ou d'hypoglycémie provoquée par une injection intraveineuse d'insuline. Les auteurs invoquent, pour justifier le caractère émotionnel de leurs expérimentations, le conflit dans lequel se trouvaient les sujets en expérience (des étudiants volontaires) entre leur malaise et le désir de se montrer courageux. En fait des mécanismes purement somatiques sont mis en jeu avec ces méthodes, et nous ne pouvons savoir ce qui revient au psychique dans les résultats observés. Le

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seul stress psychologique utilisé par ces auteurs consistait en une conversation portant sur des sujets brûlants, devant émouvoir le patient. Or, bien qu'ils nous affirment avoir pris toutes les précautions pour provoquer un stress, 4 seulement sur les 8 étudiants examinés montrèrent des modifications dans leur rythme colique. Les auteurs en conclurent que les réactions sigmoïdiennes n'étaient pas directement en relation avec les stimuli d'ambiance, mais avec l'interprétation que fait le sujet de ces stimuli.

Mais que signifie en fait pour le physiologiste cette notion "d'interprétation" du sujet? C'est l'étude centrée sur l'émotion qui va nous permettre de répondre. En effet la plupart des autres travaux approchant cette question se placent en fait sur le plan purement clinique de la constipation, et non sur le plan physiologique. Ils envisagent des données affectives complexes comme l'anxiété (WHITE, COBB, et JONES, 1939), ou même des éléments mythiques plus ou moins pornographiques, comme le fécalome-pénis de LAFORGUE et ALLENDY (ALEXANDER, 1952; LAFORGUE et ALLENDY, 1924).

Nous allons donc à notre tour discuter sur trois sigmoïdogrammes. Ils ont été pris chez deux malades, constipés psychosomatiques, dont nous retraceront rapidement l'histoire, afin de situer notre travail dans la clinique psychosomatique telle que nous l'entendons.

Les malades étaient prévenus de ce que l'examen qu'ils allaient subir serait un peu particulier, différent de ceux de la routine hospitalière. Après la préparation habituelle (lavement la veille, à jeun depuis la veille), on vérifiait à la rectoscopie l'état de vacuité de l'ampoule rectale et l'aspect de la muqueuse. Puis on introduisait au niveau de l'anse sigmoide (à 30 cm. de la marge anale) un ballonnet, relié par un système creux à une ampoule de Marey, dont le tambour portait un appareil à plume notant lee oscillations transmises sur un cylindre enregistreur. La vitesse de celle-ci était tells que la plume parcourait un grand carré de papier quadrillé en une minute.

Obs. 1, Mr. R., né en 1918, est mécanicien dans un garage parisien. Il se fait soigner pour constipation depuis 1943. Mais c'est surtout en 1947 qu'il commence à être gravement incommodé, n'allant jamais spontanément à la selle et multipliant laxatifs et lavements. Parmi les *antécédents* on note un ictère catarrhal en 1946, et une contusion du crâne ayant trainéen perte deconnaissance en 1951.

L'examen somatique ne trouve aucune cause organique à sa constipation.

L'examen psychologique n'a rien à signaler aux critères habituels des psychonévroses. Toutefois on met en évidence un ensemble de petites anomalies que, bien que laissant notre sujet dans les limites de l'habituel normal, nous montrent chez lui un trouble de l'émotion.

Facteurs héréditaires. Sa mère en l'accouchant tombe paralysée "du bras gauche et de la jambe droite"(?). Son père et sa soeur sont extrêmement "nerveux".

Facteurs de tempérament. Il a été toujours très sensible, très émotif. Une petite contrarieté, et son sommeil était agité pendant plusieurs nuits, plein de cauchemars.

Facteurs "déclenchants". Il est revendicateur, considère qu'il fait son travail dans de mauvaises conditions, que son manque de santé (sa constipation) lui a fait perdre de bonnes situations, que les hommes sont méchants, jaloux, que son honneteté est toujours mal recompensée, que la societé est mal faite . . .

Ainsi voyons-nous que, "prédisposé" à une émotion anormale, sa revendication entretient en lui ce que certains appellent un état de tension. Autrement dit, tous les stress que leur signification met en rapport avec ses sujets de revendication trouveront chez lui un seuil émotionnel abaissé (QUARTI et RENAUD, 1953).

Par ailleurs son comportement le place à la limite du normal: divorcé après quelques années de mariage, il vit seul, farouchement célibataire, fuit les distractions, les amusements.

Son affectivité est peu mûre: il divorça parce que, separé de sa femme par la guerre, il eut alors le loisir de considérer qu'ils ne s'entendaient pas, n'ayant pas la même religion, le même niveau d'instruction. Il considère que la camaraderie et l'amitié passent avant tout sentiment. Il s'énorgueillit de ressentir un pieux plaisir à porter régulièrement des fleurs à une vieille femme qu'il connait peu et qui s'occupe de son linge.

Son caractère est peu solide: il veut surtout ne pas être comme les autres et sa passion principale, qui mène son activité et marque tout son comportement, est un mélange de revendication et d'arrivisme qui se manifeste par des rêves de grandeur le plus souvent puérils.

Son sens moral est un plaquage conventionnel qui ne le retient pas de faire de la peine à ses parents en rompant définitivement avec eux. Il se prétend religieux parce qu'il ne supporterait pas qu'on manquât de respect à un curé en sa présence . . .

Bref, une personnalité normale, mais pauvre, subissant un incessant bombardement émotionnel, mais d'émotions toujours univoques, répétées, éternellement les mêmes (QUARTI et RENAUD, 1953).

L'étude des corrélations psychosomatiques et végétatives nous montre un "coefficient d'interrelations" élevé: c'est à la suite de discordes avec son frère au sujet de son travail que sa constipation est le plus tenace. Après les rapports sexuels par contre il est apaisé et moins constipé. Les thérapeutiques, dont une cure hydrominérale, réagissent toujours favorablement au début, et demeurent inefficaces ensuite.

Le malade a été traité par huit séances de psychothérapie sous narcose barbiturique (rééducation émotionnelle). Dès la cinquième séance les fonctions évacuatrices se faisaient d'elles-mêmes. Complètement guèri, il a été revu plusieurs mois après la fin du traitement. Ne prenant plus aucun laxatif, il allait régulièrement à la selle 5 à 6 fois par semaine.

Avant tout traitement on pratiqua chez ce malade un sigmoïdogramme simple, sans aucun stimulus physiologique ni psychologique. Nous en rapporterons une analyse rapide, afin d'étayer par des comparaisons nos constatations faites plus tard sur un cologramme obtenu pendant différentes stimulations psychologiques.

Les 17 premières minutes de l'enregistrement présentent un plateau où seules se marquent les ondes transmises à l'appareil par les mouvements réspiratoires abdominaux. Vers la 17 ème minute on voit débuter très progressivement et régulièrement un train d'ondes d'abord peu marquees, puis augmentant regulièrement de hauteur, marquant leurs paroxysmes toutes les 30″. Cette vague dure 17′. Elle est suivie de 1 minute 30″ d'immobilité sigmoïdienne. Puis apparaît un nouveau train d'ondes, cette fois augmentant plus rapidement d'amplitude, mais toujours régulièrement. Les ondes sont régulières et durent 30″ comme les précédentes. La durée de ce nouveau train est de 8′. Après quoi nouveau repos intestinal de 2′. Et ainsi, très régulièrement, s'intervertissent des phases d'ondes assez régulières et des phases d'immobilité pendant les temps suivants:

train d'ondes	9′
immobilité	2′
train d'ondes	5′
immobilite	2′
train d'ondes	3′
immobilite	2′
train d'ondes	3′
immobilité	2′
une onde seule	30″
immobilité	2′

Puis une grande contraction complexe, faite d'ondes très irrégulières, se joignant les unes les autres selon une courbe qui trace sur la ligne de base deux larges ondulations

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évoquant deux augmentations phasiques de tonus, le tout durant 13′. Après quoi on a de nouveau:

immobilité 3′
train d'ondes régulières 3′
immobilité 2′
grande contraction irrégulière 3′
trois ondes irrégulières de 30″, chacune, en train
grande contraction irrégulière
deux ondes en train
immobilité 2′

Ainsi, après le traumatisme de la mise en place de l'appareil, voit-on, très paresseusement et très lentement, s'installer un rythme caractérisé par sa régularité, sa progressivité et son aboutissement aux deux périodes terminales de contractions péristaltiques complexes (Fig. 1).

Très différent est l'aspect du deuxième sigmoïdogramme, qu'on pratiqua un mois plus tard, après une étude psychologique approfondie du malade (avant la période de psychothérapie proprement dite), et *sous un certain nombre de stimulations psychiques*.

Tout d'abord on note une augmentation tonique très rapide dès la 6ème minute, et l'apparition des ondes contractiles dès la fin de la 7ème minute. Ensuite on ne peut mettre en évidence cette régularité, cette progression evoquées plus haut. Enfin on ne retrouve aucun rythme dans tout le dessin des ondes sigmoïdiennes. En effet les periodes se succèdent ainsi (Fig. 2):

Augmentation tonique à la 7ème minute
train d'ondes débutant dès la 8ème minute, durée 3′
immobilité 3′
train d'ondes 9′
immobilité 2′
train d'ondes 25′
ondes complexes péristaltiques 7′
train d'ondes régulières 1 min 30″
immobilité 2 min 30″
train d'ondes 12 min 30″
immobilité 2′
contractions 2′

Nous verrons les rapports, très lâches dans l'ensemble, de chaque moment du cologramme avec les stimulations émotionnelles.

Ainsi une première constatation grossière peut-elle être faite après un regard rapide sur les deux courbes: la première met en évidence l'effort expulsif harmonieusement progressif du colon, d'abord choqué par l'intromission antiphysiologique de l'appareil et qui fait en sorte de s'en débarasser. La seconde, pratiquée sur un sujet en état de trouble émotionnel de par le caractère nouveau donné à cet examen, montre au contraire un colon se mettant à réagir très rapidement, mais sans ordre, comme sans but précis.

Nous allons maintenant analyser cette seconde courbe établie sous stress psychique. Disons d'abord qu'un bandeau est placé sur les yeux du malade qui est prévenu que

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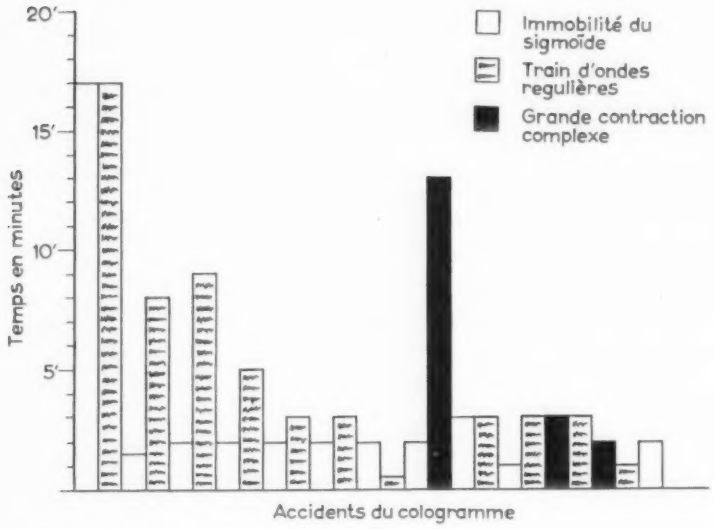

FIG. 1.

Obs. 1.—Chaque train d'ondes est séparé par une phase de repos. Celles-ci sont de durée toujours à peu près identique (2 à 3 minutes). Par contre les trains d'ondes sont de plus en plus courts et aboutissent à une grande contraction complexe (en noir) qui se reproduit moins intense, alternant avec des trains d'ondes courts sans période de repos. La succession des trains d'ondes, des phases de repos et des contractions complexes est assez régulière.

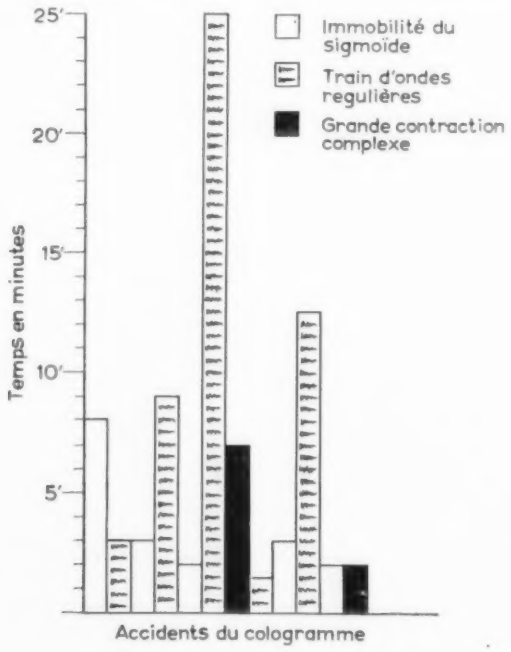

FIG. 2.

Obs. 1.—Deuxiéme cologramme (avec stimulations émotionnelles). On note le désordre complet dans la succession des périodes contractiles, contrastant avec la régularité du cologramme précedent.

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cet examen vise à étudier les rapports entre ses émotions et sa constipation. Le sujet paraît parfaitement détendu.

1er stimulus

Le sachant prompt à la bagarre, on lui demande, dès que l'appareil est mis en marche, de nous raconter sa dernière dispute. Il commence à l'évoquer de manière très vivante dès la 3ème minute de l'enregistrement et parle pendant 3′. Durant tout ce temps le sigmoïde est immobile. Seules se marquent les artéfacts de la parole. Mais, sitôt que le malade a cessé de parler, dès la fin de la 6ème minute, le tracé décolle de la ligne de base sur laquelle il se tenait, s'élève régulierement, traduisant une augmentation progressive de tonus.

Commentaire. Ainsi la stimulation psychologique endogène, obtenue par cette évocation d'une dispute, a empêché la montée tonique du sigmoïde.

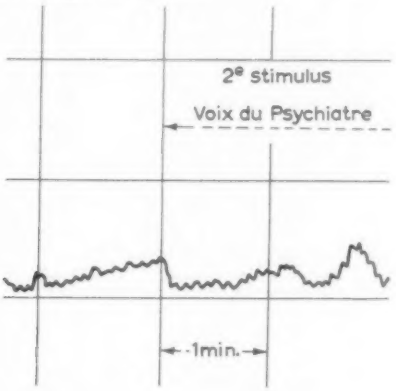

FIG. 3.
Obs. 1.—2ème stimulus. Son introduction amène une chute brusque du tonus qui commençait de monter.

2ème stimulus

Au bout d'une minute de silence, corréspondant à cette modification tonique du sigmoïde, le médecin psycholoque prend la parole pour un monologue d'une durée de 3 min 40″. Le sens général de celui-ci représente le contenu d'un rêve éveillé du malade à deux thèmes, sentimental et social. Au moment même où commence le monologue le sigmoïdogramme montre une chute, peu marquée mais nette, du tonus, la courbe ascendante fait un petit crochet vers le bas. Puis pendant 30″ la ligne reste en plateau horizontal (Fig. 3). Après quoi le tonus remonte rapidement et dessine quelques ondes assez régulières de 30″, rappelant le début des trains d'ondes décrits sur le cologramme précédent.

Commentaire. Ainsi cette stimulation, qui se voulait stimulation affective, émotionnelle d'une certaine durée, semble n'avoir réagi sur la motricité sigmoïdienne que par son début, à son introduction. Sitôt le premier moment—la phase perceptive—passé, bien que l'évocation émouvante continuât de se dérouler devant l'imagination du sujet, l'intestin s'est dérobé et a repris son impulsion motrice un instant interrompue.

3ème stimulus

Après 3 min 40″ le rêve éveillé suggéré est soudainement interrompu par une voix d'homme, inconnue du malade, qui brutalement se prétend être celle d'un policier qui soupçonne fortement notre sujet de vol et veut l'arracher immédiatement à nos soins pour le conduire au commissariat (ce thème nous a été dicté par l'interprétation que fit le sujet de certaines images du T.A.T.). Il s'agissait là d'une stimulation grossière, émouvant tout autant par sa soudaineté inattendue, le bruit des cris du policier succédant au chuchotement précédent, la voix inconnue après la voix connue, que par le sens même du discours. Cette stimulation dura 1 min 30″, pour cesser net. Des son introduction on voit un arrêt immediat de l'onde qui commençait de se former, une chute tonique. Pendant toute

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la durée du stimulus on note l'immobilité du sigmoïde, dénoncée par un plateau horizontal, lequel dure encore 40″ après la cessation de la stimulation. Après quoi la ligne tonique remonte à nouveau, une onde s'ébauche, suivie 30″ plus tard par une onde régulière, retrouvant par sa hauteur et sa durée le rythme interrompu par la stimulation (Fig. 4).

Commentaire. Il faut noter la nature grossière de cette stimulation, qui la différencie considérablement de la stimulation précédente. Ici il s'agit d'un choc destiné à déclencher une émotion brute, "instinctive" dirait CANNON (1929), par opposition a l'émotion élaborée, toute de commentaire psychologique que nous avions suscitée précédemment. Or précédemment l'intestin, passé le premier moment perceptif, avait repris son rythme. Ici il demeure paralysé sous le choc, non seulement pendant la durée de celui-ci, mais encore quelques secondes après sa cessation. Ainsi apparaît la grande distinction biologique entre deux types d'émotion, l'instinctive et la psychologiquement élaborée, distinction qui se montrera de très grande importance dans l'étude des corrélations psychosomatiques.

4*ème stimulus*

Dès que le train d'ondes sigmoïdiennes semble réinstallé, l'un d'entre nous, inconnu du malade, prend la parole pour suggérer un rêve éveillé de thème érotique. Stimulation d'une durée de 2′. L'introduction de ce nouveau stimulus se marque immédiatement par une chute brutale du tonus, juste à la fin d'une onde. Parallèlement on note une diminution très marquée de l'amplitude respiratoire. Il se dessine une onde à concavité superieure d'une vingtaine de secondes, puis la ligne remonte

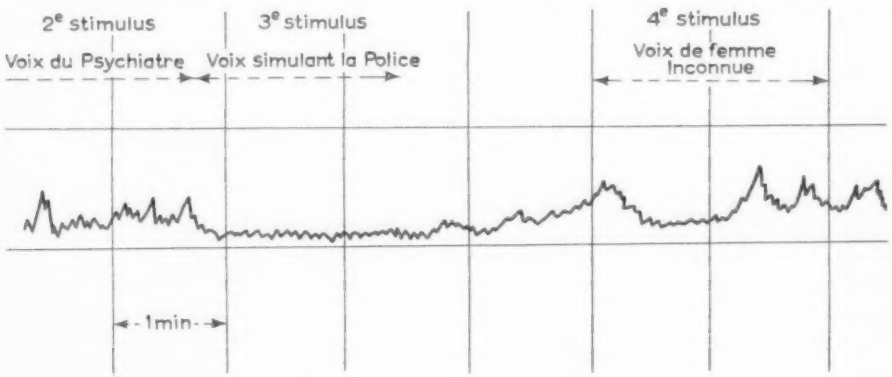

FIG. 4.
Obs. 1.—Les ondes péristaltiques ont repris leur rythme. 3ème stimulus: stimulation de type "instinctif," les mouvements intestinaux sont inhibés pendant toute sa durée. 4ème stimulus: stimulation de type "psychiquement élaborée," les mouvements intestinaux ne sont influencés que par la seule introduction du stimulus.

à son niveau antérieur, parcourt encore l'horizontale pendant 20″ et, bien que le rêve éveillé continue, une nouvelle onde se dessine, reprenant le mouvement en train, un instant interrompu. On a l'impression que, sur un train d'ondes, seule manque une pulsation, tout juste remplacée par une "onde inversée" (Fig. 4).

Commentaire. On voit à nouveau que le stimulus complexe réagit sur l'intestin par sa seule introduction. La motricité de celui-ci demeure indifferente au déroulement de cette sorte d'émotion.

5*ème stimulus*

Sans transition avec cette dernière stimulation, une autre voix inconnue continue le rêve eveillé erotique, passant de l'évocation heterosexuelle précédente à l'évocation homosexuelle (conformement à des indications données par des tests projectifs chez ce sujet). Cette nouvelle intervention ne se traduit pas même par son introduction sur le rythme sigmoïdien. Le train d'ondes ébauché, et par deux fois interrompu anterieurement, se poursuit régulièrement, s'inhibant progressivement et régulièrement après les 9′ de la stimulation.

Commentaire. On peut peut-être imputer cette absence de réponse à l'introduction du stimulus au

fait qu'il se produisait trop rapidement après le précédent, auquel l'intestin venait tout juste d'échapper. En fait il est plus probable que ce nouveau stimulus n'ait pas provoqué d'émotion pour des raisons psychophysiologiques, que nous exposerons plus loin.

6ème stimulus

La voix du psychologue se fait à nouveau entendre après quelques minutes, entreprenant un commentaire sur le thème de la revendication, destiné non plus à évoquer des images, mais à provoquer des réactions idéatives et associatives. La traduction colographique se calque sur les précédentes. Le début du discours interrompt une onde au moment de son ascention. La ligne redescend immediatement et reste en un plateau rigide pendant un peu plus de 30″, escamotant ainsi une onde. Puis la plume remonte et dessine une nouvelle onde, dont la hauteur est régulièrement augmenté par rapport à la précédente, comme si l'onde intermédiaire n'avait pas été "oubliée" (Fig. 5). Et, bien que la stimulation dure 4′, ce nouveau train d'ondes se poursuit durant 8′. On note ensuite une immobilité d'une minute et un nouveau train d'ondes s'introduit.

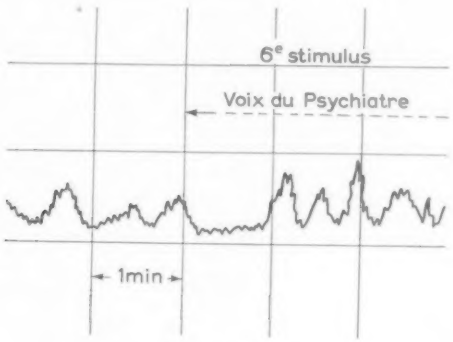

FIG. 5.
Obs. 2.—6ème stimulus, de type "psychiquement élaboré": son introduction inhibe une onde péristaltique.

7ème stimulus

Pendant que se dessine la troisième de ces ondes le psychologue reprend la parole, commentant toujours les sujets de revendication particulièrement chersau malade. L'onde est escamotée, la ligne marque à peine une petite élevure. Mais 30″ plus tard le rythme reprend, et là encore la hauteur de

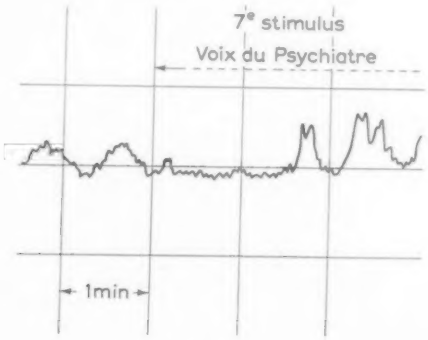

FIG. 6.
Obs. 2.—7ème stimulus, de type "psychiquement élaboré": son introduction seule est marquée au niveau des mouvements intestinaux.

l'onde qui suit "l'oubliée" est régulièrement élèvée par rapport à celle qui la précédait, comme s'il n'y avait pas eu d'interruption. L'augmentation en hauteur de ces ondes suit sa progression, sans

tenir compte du raté qui produit l'introduction du stimulus émotionnel (Fig. 6). La stimulation dure 4′, les ondes se poursuivent régulièrement.

8ème stimulus

Une minute après la cessation du discours précédent, on enlève le bandeau des yeux du malade, lui permettant de les ouvrir. Cette stimulation visuelle n'est absolument pas ressentie par le rythme intestinal, qui poursuit son train d'ondes régulières de 30″ pendant 13′ encore, jusqu'au nouveau stimulus.

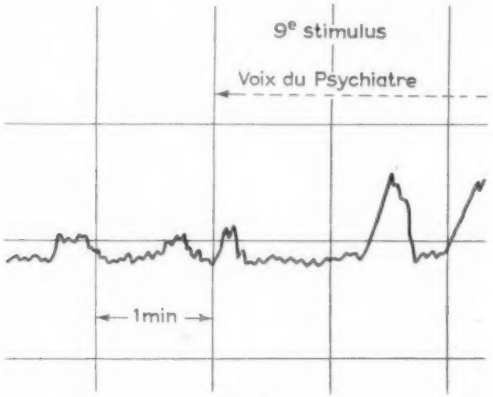

FIG. 7.
Obs. 1.—9ème stimulus, de type "psychiquement élaboré": son introduction inhibe une onde péristaltique naissante.

9ème stimulus

A la 2ème minute on remet le bandeau sur les yeux et à la 13ème minute de ce long train d'ondes régulières le psychologue reprend la parole sur le même thème de revendication-frustration. Le début de ce stimulus est marqué par l'habituel arrêt rythmique, avec cette fois une ébauche de diminution tonique, en courbe concave vers le haut, de 20″. Puis, malgré la continuation du stimulus, le train d'ondes se poursuit, plus irrégulier, plus expulsif, pendant 6 minutes. Après quoi on note une immobilité colique de 2′ (Fig. 7).

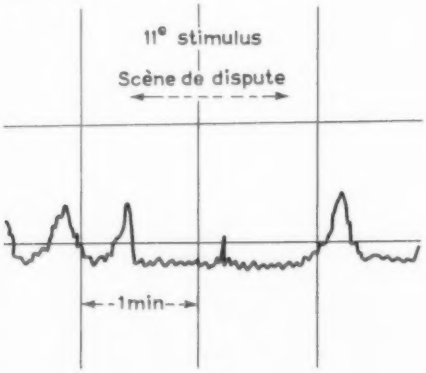

FIG. 8.
Obs. 1.—11ème stimulus, de type "instinctif": l'intestin est inhibé pendant tout sa durée.

10ème stimulus

C'est encore le même type de stimulus, fait par le psychologue. Son début coincide avec le début

d'un train d'ondes. Il ne l'affecte en rien. La cessation du stimulus au bout de 3′ n'a pas plus de traduction sigmoïdienne. Ce train d'ondes régulières va durer 12′ 30″. A ce moment en effet on applique le dernier stimulus.

11ème stimulus

C'est l'entrée brutale, extrêmement bruyante, dans la pièce où se trouve le sujet, d'un couple (voix inconnues), qui manifeste violemment un comportement de querelle. Hurlements, injures, bruits de coups se mêlent pendant un peu moins d'une minute. Le train d'ondes est immédiatement interrompu, et la plume trace un plateau rigide pendant la durée du stimulus. A sa cessation un artefact respiratoire débute un second plateau d'une durée de 30″ environ, situé à un niveau inferieur au premier, c'est dire signant une brusque chute tonique. Puis la motricité reprend et au bout de deux ondes régulières on interrompt l'enregistrement (Fig. 8).

Commentaire. Ce stimulus se rapproche du numero 3 et par toutes ses caractéristiques il est destiné à éveiller une émotionde type "instinctif." Ainsi qu'on pouvait s'y attendre, la motricité du sigmoïde à réagi là éxactement comme lors de la 3ème stimulation, par un arrêt de la motricité et même une chute, peu importante mais nette, du tonus musculaire. L'intestin a réagi à toute la durée de la stimulation et même est resté immobile 30″ après sa cessation.

Au terme de cette analyse il apparaît, comme l'un d'entre nous l'a déjà souligné, qu'on doive, dans l'étude des rapports entre émotion et motricité sigmoïdienne, tenir compte non seulement de *la différence essentielle entre les deux types d'émotion évoquées alternativement chez notre sujet* (*émotion instinctivement et émotion psychiquement élaborée*), mais encore l'*architecture même du phénomène émotionnel* (RENAUD, 1953). En effet, dans l'évolution cyclique de l'émotion, sur le plan psychologique comme sur le plan biologique, on peut distinguer trois phases, qui se succèdent, tout en s'interpénétrant plus ou moins à leurs limites:

(a) la phase initiale, qui corréspond à la perception du stress qui va déclencher l'émotion (*phase perceptive*);

(b) *la phase de commentaire*, qui corréspond au corps même du moment émotionnel;

(c) *la phase d'amortissement*, qui correspond au retour à l'équilibre antérieur (ECCLES, 1953).

De nombreuses études biologiques ont montré que le phénomène émotionnel dans son ensemble était un jeu d'interactions psychosomatiques, tout au long de ces trois phases (WOLFF, 1953; *Proc. Ass. N. M. Dis.*, 1950; WHITEHORN, 1939; WOLFF H. *et* WOLFF S., 1948). Or l'intérêt de l'étude des variations du tracé précédent sous l'effet de divers stress psychiques est de montrer que le sigmoïde peut répondre à ces stress selon trois attitudes: (1) ou bien on note un arrêt des ondes contractiles durant le temps de la stimulation et même un peu après. L'émotion est toute entière ressentie par l'intestin; (2) ou bien l'arrêt ne se manifeste que comme un raté, une onde esquivée, marquant la seule phase perceptive de l'émotion; (3) ou bien, et c'est plus rare, le phénomène émotionnel ne comporte aucune traduction sigmoïdienne.

Ces trois possibilités ne sont nullement le fait du hasard, mais correspondent à des types ou à des moments émotionnels différents, dans leur nature même, comme nous le verrons plus loin. Rappelons que ces réactions ne sont valables que pour la catégorie des sujets dont le psychisme est sain examiné aux critères psychiatriques. Le seul trouble mis en évidence ici siège au niveau de la seule "fonction émotionnelle." Celle-ci s'exprime anormalement chez un sujet par ailleurs normal.

Il nous faut maintenant étudier l'apport du sigmoïdogramme chez un sujet à psychisme fonctionellement anormal, chez lequel apparaissent les signes d'une psychonévrose.

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Obs. 2. Madame D., née en 1913, est infirmière. Elle présente une constipation chronique nécessitant la prise journalière de laxatifs, et parfois plusieurs lavements, exacerbée en crises de "bloquage complet" de 4 a 5 jours. Elle se souvient d'avoir été constipée depuis son enfance. On note de plus de l'aérocolie. Par ailleurs elle présente depuis la venue des règles (16 ans) des crises de forte céphalée avec nausée et vomissements, coincidant avec les crises de constipation accentuée. Ces crises surviennent au moment des règles, mais aussi à la suite d'ennuis ou de contrariétés. On note de plus une appendicite en 1929, une crise de colique néphritique en 1930, une grossesse extra-utérine en 1948 ayant necessité l'ablation de trompe et ovaire droits.

Les radiographies, le tubage gastrique ne montrent rien.

L'examen psychologique met en évidence un trouble psychique important.

Son comportement est anormal: la malade est agitée à l'extrême, rit pour rien et très haut, raconte ses histoires avec une grande volubilité et une mimique souvent inadaptée a ce qu'elle dit, fait des "coq-à-l'ane" inattendus.

Son affectivité est anormale à cause de son extrême superficialité et de la pauvreté de ses harmoniques.

Son raisonnement est faible: pouvoir syllogistique très fragile, associations incohérentes.

Il apparaît surtout une sorte d'hyperexcitabilité de *l'attention*, qui fait de la malade, incapable de concentration, incapable de pleine participation consciente à l'instant qu'elle vit, un fétu de paille emporté au gré des mille stimuli de son ambiance, auxquels ses automatismes réagissent en bloc. Bref, la vie psychologique de cette malade pourrait se résumer en un jeu de patterns réactifs declenchés au hasard des influences ambiantes, et ceci évoque la symptomatologie de l'hypomanie.

Nous n'avons pu mettre en evidence de *facteurs héréditaires*.

Mais dans les *antécédents* on retrouve de nombreux éléments de conditionnement anormaux: le père ivrogne martyrisait sa famille, sept frères brutaux terrorisaient l'enfant, qui "vivait en retenant son souffle", toujours dans l'attente du drame, de la douleur, du malheur. Tout au cours de son histoire la malade n'a jamais pu trouver un moment d'apaisement, de laisser aller, ni personne auprès de qui s'épencher. Mariée jeune pour fuir cette famille pénible, elle a tout d'abord de gros traumatismes sexuels, dus à une mésentente physique complète avec son mari. Puis, celui-ci affichant ostensiblement ses maîtresses, elle vit dans une crispation, une colère continuelles. Enfin elle vient de terminer une longue et coûteuse procédure de divorce.

Ainsi toujours surtendue, et sur tous les axes de sa vie affective, on conçoit que cette malade ait aquis un abaissement définitif et généralisé du seuil émotionnel, ce qui signifie que, quelque soit la signification du stress, la moindre excitation s'intègre chez elle en émotion (QUARTI et RENAUD, 1953). D'autre part elle présente un trouble de l'amortissement émotionnel. Le mouvement déclenché par l'émotion dure longtemps, souvent jusqu'à ce qu'un nouveau stress relance le mécanisme, avant même qu'il ait commencé de ralentir ses effets. Ainsi la malade vit-elle dans une sorte de mouvement perpétuel.

Enfin apparaît un trouble plus grave de la "fonction émotionnelle" dans son caractère d'automatisme lui-même. La malade est "émotionnée," pourrait-on dire, par un stimulus perceptif minime autant qu'important, mais sans être affectée par son émotion. C'est comme si une réaction émotionnelle "passe-partout" se déclenchait automatiquement quelque soit la stimulation, et sans qu'il existe aucun rapport avec cette stimulation, ni même avec l'affectivité propre du malade.

Au terme de cette analyse on voit que la "*fonction émotionnelle*" est extrêmement troublé chez notre malade, à la fois dans sa maturation, et à la fois dans son état actuel. En effet le rythme en est précipité, le seuil abaissé, l'amortissement déficient. Et surtout l'architecture en est pathologique, en ce que le commentaire affectif y semble inexistant et que toute échelle des intensités soit disparue chez cette malade.

On a institué une thérapeutique de rééducation émotionnelle sous narcose barbiturique 8 séances) (QUARTI et RENAUD, 1954). Le trouble somatique avait disparu a la fin du traitement: elle allait à la selle 4 a 5 fois par semaine spontanément, et ne présenta plus de crises céphalalgique, plus de vomissements pendant 4 semaines (y compris la periode des règles). Après quoi nous a perdîmes de vue. Toutefois le terrain psychonévrotique étant demeuré pratiquement inchangé, on peut craindre une rechute et prévoir qu'il faille "entretenir" cette malade de petites cures de redressement émotionnel de 5 à 8 séances tous les six mois environs.

Un sigmoïdogramme pratiqué chez elle en octobre 1952 peut être analysé de la façon suivante: (Fig. 9) malgré que la malade soit dûment prévenue et consentante, elle n'arrive pas à être détendue et après 15′ d'enregistrement on ne voit pas la moindre ébauche de contraction.

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1èr stimulus

On provoque alors une première stimulation grossièrement affective, déclenchant la peur: une personne inconnue de la malade vient subitement lui dire qu'elle la reconnait comme impliquée dans un meurtre dont les journaux viennent de faire grand bruit. L'émotion est certaine, comme le prouvent entre autre les nombreux artéfacts respiratoires. Mais sous ces artéfacts on ne distingue aucune réaction colique. La perturbation dure 5′ environ. Les artéfacts vont diminuant.

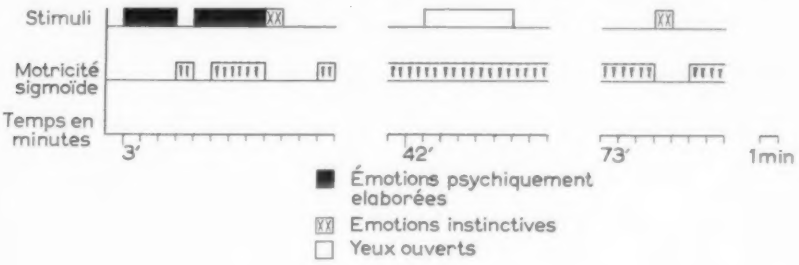

FIG. 9.

Obs. 1.—Deuxième cologramme (avec stimulations émotionnelles). Seules les stimulations "émotion instinctive" inhibent la motricé sigmoïdienne pendant toute leur durée. Le début de chaque stimulation (phase perceptive) est marqué d'un court arrêt des trains d'ondes, qui dure un peu plus longtemps que le temps de la stimulation. Par contre les stimulations émotionnelles non instinctives, psychiquement élaborées, ne déterminent qu'un court arrêt au moment de leur introduction (phase perceptive).

2ème stimulus

30″ après la cessation du mouvement émotionnel ainsi produit, on prend une stimulation de type plus intellectuel: une méditation très imagée sur le thème de la mort, de la peur de la mort (durée 5′). On n'a plus les artéfacts anarchiques de la précédente période, mais on voit le rythme réspiratoire s'accélérer progressivement jusqu'à la cessation du discours, où il reprend subitement son allure d'avant la stimulation. Toutefois on ne note toujours aucune tendance contractile, aucune modification tonique.

Deux minutes aprés la cessation de ce dernier stimulus, alors que la malade semble éprouver un immédiat soulagement de ne plus entendre parler de la mort (car incapable de maintenir par elle-même ses pensées sur ce thème suggéré), il se produit, comme par contraste avec la période de tension précédente, une brusque libération. Et l'on voit la plume du colographe tracer une magnifique onde contractile, rapide mais haute, dont la branche descendante s'arrête à mi-chemin pour tracer un plateau surélevé par rapport à la ligne de base, signifiant une augmentation résiduelle de tonus.

3ème stimulation

Une minute et demi après ce dernier phénomène on tente de concentrer l'attention de la malade sur un jeu de patience (test praxique), afin de provoquer chez elle, de par sa difficulté à se concentrer, un état de tension et de crispation. Ce stimulus reste apparemment sans effet colique. Le plateau d'augmentation tonique, debuté avant la stimulation, s'effondre au milieu même de l'épreuve pour reprendre sa ligne de base, sans qu'on note aucune autre manifestation.

4ème et 5ème stimulus

Deux autres stimuli du meme type sont employés. L'effet de surtension, de crispation est cliniquement obtenu, mais le sigmoïdogramme demeure à la ligne de base, sans modifications, en un plateau rigide, marqué seulement de quelques artéfacts réspiratoires.

6ème stimulus

Des planches considérées comme contenant des charges affectives (planches du T.A.T.) sont presentées à la malade (10 planches en 5′ 40″) Le rythme réspiratoire s'accélère legerement. Rien à signaler au sujet colique. Après 3′ de repos on note une petite onde contractile isolée sur le plateau.

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7ème stimulus

Six minutes après le précédent stimulus on pratique la stimulation de la dispute dejà décrite dans l'observation n° 1. Elle est marquée sur le cologramme par une modification réspiratoire et surtout par une surélevation en plateau de la ligne de base, dont la durée correspond exactement à la durée de la stimulation (Fig. 10).

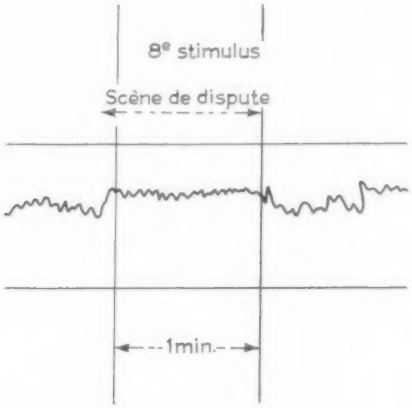

FIG. 10.
Obs. 2.—Stimulation "instinctive," marquée par une élévation en plateau, légère mais certaine, du tonus intestinal.

8ème et 9ème stimulus

Sont tous deux de type psychique évolué. La seule traduction est une modification du rythme respiratoire. Aucune modification tonique, aucune contraction.

Ainsi voilà une malade chez laquelle on a pratiqué un enregistrement d'une heure 33′, au cours duquel on ne voit apparaître que deux contractions isolées et quelques modifications toniques en plateau rigide. Les deux contractions enregistrées se situent dans un moment où, délivrée d'un état d'oppression émotionnelle artificiellement provoquée, la malade ressent, par comparaison, une impression de détente.

On a vu, à propos du cas précédent, que l'émotion semble inhiber les ondes contractiles intestinales. Aussi peut-on penser que chez notre malade l'état de tension émotionnelle quasi perpétuelle inhibe presque toute tentative de motricité contractile du sigmoïde. Les émotions que nous avons déclenchées chez ce sujet se surimposent sur un état de fond émotif permanent, et ne peuvent avoir de traduction sigmoïdienne que par leur cessation, laquelle, par une sorte de "rebound" psychique, délivre un instant la malade de son mouvement perpétuel.

DISCUSSION

Au terme de ces analyses quels éléments pourrons-nous retenir pour juger de la participation sigmoïdienne à l'émotion?

(1) En général *l'émotion se traduit au niveau du sigmoide par une impulsion inhibitrice de sa motricité:* chacune de nos stimulations s'est manifestée pour le moins par un arrêt momentané de l'onde contractile.

(2) *Certaines émotions n'ont de participation sigmoïdienne que lors de leur début, de leur introduction.* C'est cette chute d'un instant dans la contraction intestinale que le 2ème cologramme de notre premier sujet nous a montré pour la plupart des stimuli.

(3) *D'autres émotions au contraire se traduisent par une inhibition plus durable de la motricité*, l'intestin demeurant immobile pendant toute la durée du stimulus émotionnel, et même quelques secondes après sa cessation. Le 2ème cologramme de notre première observation nous montre trois accidents de ce genre (stimuli n°. 1; 3, 11) Le cologramme n°. 3, pris chez un sujet (obs. n°. 2) en tension émotionnelle permanente, est presque tout entier un tracé d'inhibition motrice.

(4) Chez cette derniére malade deux contractions en onde ont été tout de même possibles, dans des périodes d'intervalle entre les stimulations surajoutées par l'experimentation.

(5) *La répétition des stress émotionnels introduit l'anarchie dans le rythme de succession des contractions*, comme il est vu par comparaison entre les cologrammes 1 et 2 ((1ère observation).

(6) La tension émotionnelle incessante (cologramme n°. 3) permet, outre les deux ondes contractiles signalées plus haut, deux plateaux d'augmentation tonique, l'un produit inopinément, semble-t-il, après la première onde contractile, l'autre correspondant a la durée d'une stimulation émotionnelle assez violente.

Ces constatations vont servir de base à la discussion sur l'effet de l'émotion normale et anormale sur la motricité sigmoïdienne.

(A) Tout d'abord il n'est pas étonnant que le sens végétatif premier de la perception émotionnelle soit en général *inhibiteur de la motricité intestinale* (GARRY, 1934; HINES *et al.*, 1929) Il s'agit là en effet d'un "à-coup" de sens sympatho-adrénalinique (BARD, 1939). Donc chez un sujet en équilibre végétatif on doit avoir un freinage intestinal contemporain de cette émotion.

A l'opposé, chez un sujet en état de surtension émotionnelle, le tonus végétatif n'est plus équilibré. Les incessantes décharges de sens sympathique, que provoque cette tension affective, sont tant bien que mal balancées par les contrecoups parasympathiques que tout influx sympathique suscite automatiquement (GELLHORN, 1943). Chez notre 2ème malade (cologramme n°. 3) la balance penchait vers le sens sympathique puisque le colon demeurait immobile. Notre dernière stimulation, très violente, est arrivée, semble-t-il, a forcer le seuil de ce système sympathique-parasympathique-muscle intestinal, anormalement tendu, et la réponse a été non pas sympathique, mais parasympathique, c'est a dire s'est marquée par une élévation du tonus. Ceci n'est pas étonnant et en rien paradoxal avec les données précédentes. On peut admettre en effet que notre stimulation, surajoutant encore une décharge sympathique dans le système en concurrence dynamique sympatho-parasympathique, a permis à la réaction parasympathique, suscitée en même temps que l'action sympathique, d'être plus forte que celle-ci (TARDIEU et TARDIEU, 1948; KUNTZ, 1953).

Toutefois nous avons une contraction tonique, et non un train d'ondes, ce qui nous prouve bien que ces modifications se font au sein même de l'hypertonus neuro-végétatif. En effet, alors que normalement les influx du système nerveux extrinsèque apparaissent pour stimuler d'un à-coup le complexe neuro-musculaire intestinal, qui se meut de par sa propre autonomie selon le rythme ondulatoire, simplement controlé par ce système extrinsèque, nous voyons ici les influx végétatifs dépasser leur but et stimuler d'une manière continue le muscle intestinal. Celui-ci ne peut plus exprimer sa motricité propre de type ondulatoire, et réagit comme un muscle ordinaire à un influx centrifuge, c'est à dire par une contraction unique (ALVAREZ, 1922).

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Ainsi voyons-nous que l'émotion se manifestera différemment, au niveau colique, selon l'état de tension affective du sujet au moment où celui-ci éprouve cette émotion.

(B) Une remarque plus importante doit être faite. Nous avons vu que certaines émotions ne se traduisent à l'intestin que par un arrêt de 30″ dans le train des ondes contractiles, alors que d'autres inhibent la motricité intestinale pendant toute leur durée. *Existe-t-il plusieurs types d'émotions, et à quoi ces types correspondent-ils physiologiquement?*

C'est *l'étude neurophysiologique de la perception émotionnelle* qui nous aidera à répondre, étude dont nous allons tracer ci-dessous l'essentiel.

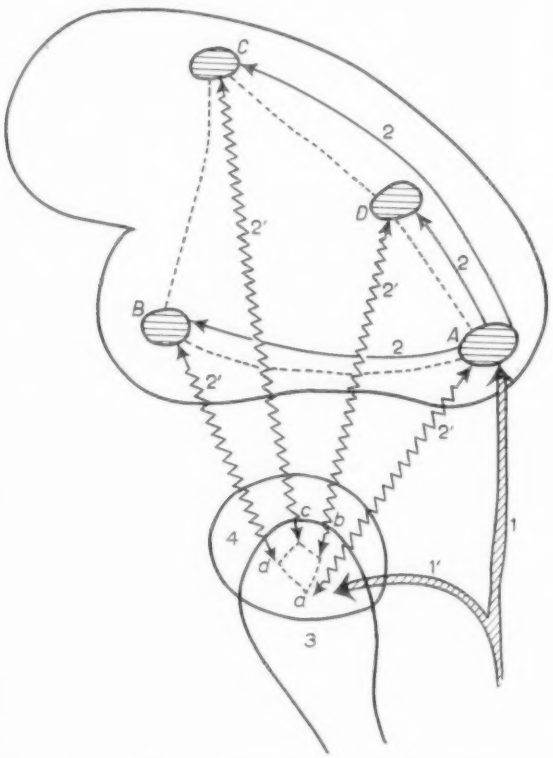

FIG. 11.—Schéma de la perception simple.
1: afférence sensorielle
1′: collatérale pour la substance réticulaire
2: connexions intracorticales
2′: voies réticulo-corticales.
3: substance réticulaire bulbo-mésencephalo-thalamique.
4: thalamus.
A, B, C, D,: régions d'embrasement cortical.
a, b, c, d,: pattern réticulaire.

En effet toute perception quelle qu'elle soit, se fait grâce à un jeu d'aller et retour incessant d'influx entre cortex et sous-cortex (LIHN, 1953), en même temps qu'au sein même du niveau cortical et des niveaux sous-corticaux des échanges d'influx se font entre différents groupes neuronaux (ECCLES, 1953). Si bien que les points d'arrivée et de départ de ces trains d'influx cortico-souscorticaux se modifient sans cesse, au gré des informations reçues lors de chacun des trajets "verticaux" et "horizontaux" de l'influx nerveux. C'est le système de régulation par feed-back, bien étudié maintenant grâce à la

cybernétique (WIENER, 1948). Or, tant l'expérience psycho-chirurgicale (FREEMAN et WATTS, 1950) que l'expérimentation, ont permis de distinguer deux modes de réflexion des influx cortico-sous corticaux:

—le premier reste, semble-t-il, essentiellement cortico-thalamique (JASPER, 1952).

—le second fait participer l'hippocampe (et la circonvolution limbique vraisemblablement) au jeu de réflexion reciproque des influx nerveux (PRIBRAM et LENNOX, 1950).

Et ces deux types de circuits semblent permettre deux manières différentes de perceptions, en tout cas expliquent fort bien les différences organiques que nous notons lors de différentes perceptions.

On peut schématiquement s'expliquer ainsi le processus perceptif: une stimulation sensible quelconque est transmise dans les centres à la fois au niveau de la substance réticulaire mésencephalo-thalamique et dans la région corticale-spécifique s'il y a lieu (aires visuelle, auditive etc.). L'activation

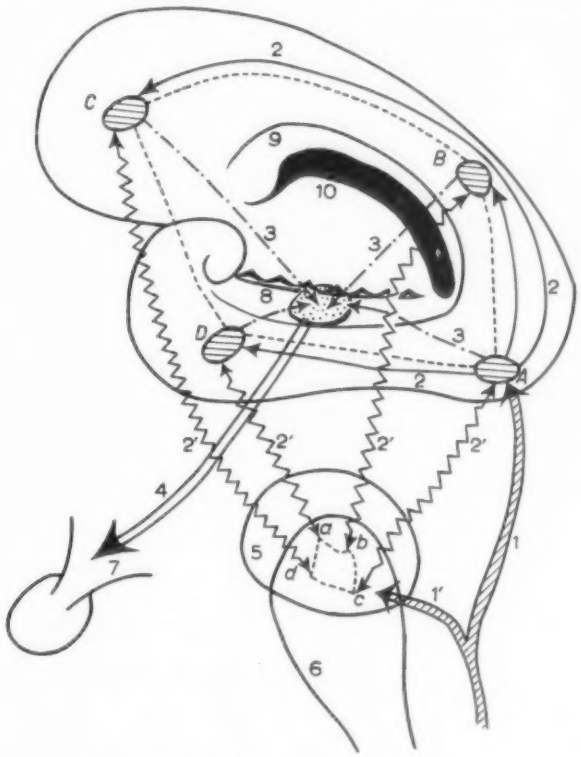

FIG. 12.—Schéma de la perception émotionnelle.
1, 1′: afférence sensorielle et sa collatérale pour la substance réticulaire.
2: connexions intracorticales.
2′: voies réticule-corticales.
3: connexions cortico-hippocampales.
4: connexions hippocampo-hypothalmiques.
5: thalamus.
6: substance réticulaire.
7: hypothalamus.
8: hippocampe.
9: circonvolution limbique.
10: corps calleux.
A, B, C, D: pattern cortical.

réticulaire se transmet immédiatement à tout le cortex où elle produit la "reaction d'éveil," facilitant ainsi les associations intracorticales qui se font, dans le même temps, à partir de la zone tout d'abord embrasée par l'afférence sensible (MACOUN, 1952). Selon les patterns evoqués par ces associations

intracorticales, l'influx qui revient bombarder la substance réticulaire sollicitera de celle-ci qu'à son tour elle active telle ou telle région de l'encéphale. Ainsi peut s'effectuer le choix neuronique, selon la signification du stimulus, c'est a dire des patterns evoqués au niveau cortical, entre deux types de circuits (VERZEANO *et al.*, 1953) (MEDUNA, 1950) (Figs. 11 et 12).

Le premier reste cortico-réticulaire, c'est à dire que la perception s'achève grâce à des associations corticales, que les influx réticulaires préparent selon les incitations qui leur sont envoyées (HAUBERY et JASPER, 1953). Mais la substance réticulaire ne joue là que son rôle dynamique, qui consiste à amener à un état d'excitation juste sous-liminaire des groupes de cellules corticales, qui ainsi se trouvent toutes prêtes a repondre aux incitations venues d'autres régions corticales. La fonction de signification de la perception se fait donc probablement toute au niveau cortical. Il n'y a rien là—ou presque—de végétatif, il s'agit d'une perception purement intellectuelle. Nous avons vu que l'ouverture des yeux, au cours du cologramme n°. 2, n'avait aucune traduction sigmoidienne. C'etait donc une de ces perceptions "intellectuelles," cortico-réticulaire.

L'autre type de circuit nous intéresse davantage. C'est celui de la *perception émotionnelle*. Au circuit précédent viennent participer des régions où l'on aime parfois à localiser l'affectivité: l'hippocampe, la circonvolution limbique, les circonvolutions orbitaires du lobe frontal (PRIBRAM et BAGSHAW, 1953). La danse des influx n'est plus seulement corticoréticulaire. C'est une figure complexe orchestrée par la sustance réticulaire (QUARTI et RENAUD 1954) qui va préparer telle ou telle région, selon les incitations qui lui parviennent (MCCULLOCH et HENNEMAN, 1948). Mais l'essentiel, dans cet autre mode de percevoir, est le suivant: ces régions, hippocampe, aire orbitaire frontale, forment un ensemble fonctionnel qui est en étroite rélation fonctionnelle toujours selon le système feed-back—avec l'hypothalamus, et par là avec toute l'organisation végétative de l'individu (FULTON, 1950).

Ainsi l'énergie entrée avec la stimulation au sein du système nerveux central, démultipliée par la substance réticulaire, au lieu de se résoudre en seuls circuits corticaux, va embraser des commandes végétatives. La réaction végétative à son tour est ressentie au niveau des centres comme une "stimulation en retour." Et cet autre type de perception est ainsi la résultante de plusieurs circuits en feed-back, s'influençant les uns les autres. Il s'agit là d'une perception de nature émotionnelle.

Nous avons donc tracé très schématiquement les différences qui separent perception simple de perception émotionnelle. Quand réagit le sigmoïde, quand s'accélére la respiration, quand les lèvres se mettent a trembler, etc., il s'agit de perception émotionelle. Quand rien de tout cela ne se passe il s'agit de perception simple ou intellectuelle.

Or ce que nous montre le cologramme, avec ici une inhibition de 30″, et là une autre durant autant que la stimulation émotionnelle, va s'éclairer maintenant. Revenons aux trois attitudes observées au cours de l'enregistrement sigmoïdographique sous stress variés.

(a) *Absence de réponse*. Le colon continue son train d'ondes malgré la stimulation produite par l'ouverture des yeux, par exemple. Nous pouvons admettre qu'il s'agit là d'une *perception simple*, purement cortico-réticulaire, sans participation limbique notable.

(b) *Réponse durable*. Arrêt des contractions, durant un peu plus longtemps que le stress lui-même (stimuli 3 et 11). Il s'agit de ce que nous avons appelé *émotion instinctive*. On peut admettre que là le mouvement introduit au sein du système nerveux central par la perception du stress a déclenché la participation des circuits limbiques, et par là des systèmes hypothalamiques. Or les résonances sémantiques de ce stress etaient telles que le commentaire émotionnel, grâce au jeu de feed-back déclenché par la signification même du stress, a continué de faire participer le contingent limbique-hypothalamique à la perturbation nerveuse. Pendant toute la durée de l'émotion l'hypothalamus a déchargé et l'intestin a été inhibé (WANG et CLARKE, 1940).

(c) *Réponse d'inhibition sigmoïdienne à la seule introduction du stimulus*. Ceci correspond a ce que nous avons appelé "*émotion psychiquement élaborée*". On peut

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admettre que la seule perception émotionnelle a nécessité la participation limbique. La signification de ce genre d'émotion, une fois perçue, est telle que le cortex continue son commentaire selon des circuits qui ne nécessite plus la voie hypothalamique. L'inhibition des mécanismes hypothalamiques s'explique maintenant grâce à la connaissance des systèmes d'inhibition échelonnés à tous les étages du système nerveux central, et mis en branle eux aussi selon les mécanismes feed-back, a partir du cortex par l'intermédiaire de la substance réticulaire du tronc cérébral. Une telle émotion, dont le commentaire se poursuit ainsi dans les niveaux purement psychologiques, sans participation organique (ou tout au moins minime, non présente au sigmoïde par exemple), nous paraît justifier l'appellation de "psychiquement élaborée." En fait, si l'on interroge le sujet, on apprend qu'il a certes été *étonné* par l'introduction du stimulus, il a sursauté interieurement, mais c'est tout; il a continué d'y penser sans participer vraiment organiquement à ce qui lui était suggéré. L'émotion "vraie" se serait résumée ici à n'être que son introduction, que la *perception*. La suite n'a été que commentaire intellectuel, auquel le circuit hypothalamique ne participait pas.

Quant a notre cas n°. 2, les anomalies de sa motricité sigmoïdienne s'expliquent aussi très bien grâce a ces données neurophysiologiques. L'état de surtension émotionnelle dans lequel vivait cette malade doit correspondre à une absence, ou tout au moins une défaillance, de ces systèmes inhibiteurs centraux (ECCLES, MCCULLOCH, et MEDUNA), telle que circuits limbiques-hypothalamiques participent d'une manière continue à son fonctionnement nerveux central. Les à-coups apportés par des émotions fortes se surimpriment sous l'aspect de décharges hypothalamiques plus puissantes sur un fond de décharges permanentes. L'électroencéphalographie apporte un argument considérable à l'appui de cette thèse, en montrant d'une manière quasi constante chez ces malades la présence d'ondes lentes, dites "de la base."

Nous avons longuement insisté sur ces données de neurophysiologie parce qu'elles seules, nous semble-t-il, vont permettre de comprendre comment une perturbation affective peut introduire la maladie psychosomatique. Il est facile de concevoir que, si pour un sujet certains stimuli ont une signification anormalement émotionnelle, les patterns évoqués par ces stimuli au niveau du système nerveux central, au lieu de permettre un amortissement rapide des circuits hypothalamiques, au lieu de se résumer, comme normalement, en un apport énergétique au sein de l'économie, vont au contraire entretenir plus ou moins longtemps, parfois indéfiniment, un bombardement neuro-végétatif pathogène. Nous avons là l'origine centrale du phénomène étudié par REILLY à la périphérie. On comprend que, les jonctions neuro-musculaires et neuro-vasculaires de l'intestin, par exemple, étant soumises anarchiquement à ces stimulations végétatives anormales, on puisse voir apparaître au minimum des troubles dans l'ordonnance du transit intestinal (constipation, diarrhée), au maximum des phénomènes congestifs, oedémateux et même érosifs, des rectocolites muqueuses et hémorragiques.

La *thérapeutique* psychosomatique prend dés lors une tout autre signification que celle de fantaisie qu'on lui donne trop souvent. Ayant mis en évidence ces mécanismes physio-pathologiques que nous venons d'évoquer, il s'agira pour le médecin de combiner les armes psychologiques et biologiques pour redresser l'anomalie première de l'émotion.

La psychothérapie visera à modifier la réceptivité affective du malade de manière à

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ce que les différents stress de la vie quotidienne perdent leur signification "instinctive" (les stress ainsi pathogènes pouvant s'etendre sur tout le champ affectif ou ne se localiser qu'autour de quelques thèmes traumatisants).

Les différents moyens biologiques (allant de la narcose barbiturique, la carbo-narcose, le choc amphétaminique, la réflexo-thérapie, aux techniques psycho-chirurgicales) viseront à rééduquer le jeu d'interactions psycho-somatiques dans son intimité neurophysiologique même. Ainsi l'émotion, loin d'être pathogène, pourra-t-elle redevenir la source vivifiante de dynamisme grâce auquel la personne dans sa totalité, corps et esprit, saura vaincre la maladie.

RÉSUMÉ

Au cours d'une rapide introduction les auteurs situent leur travail dans l'étude générale, psychologique et physiologique, de l'émotion, et cette dernière étude dans l'ensemble des problèmes posés par la Médecine Psychosomatique. Ils distinguent (1) les sujets présentant un simple trouble émotionnel évoluant sur un psychisme par ailleurs normal; (2) les névrosés; (3) les psychopathes. Ils ne discuterons que des manifestations émotionnelles observées dans les deux premiers cas, le troisième posant la question non encore résolue de l'organicité des troubles observés, ce qui introduit un facteur supplémentaire de confusion dans le problème psychosomatique.

Le premier malade observé presente un simple trouble émotionnel. Un premier tracé sigmoïdographique, enregistré à l'état de repos, montre la progression harmonieuse des ondes contractiles, et diffère grandement du deuxième tracé, obtenu pendant des stress émotionnels variés. La seconde observation rapporte un cas de névrose et étudie son sigmoïdogramme enregistre pendant des stimulations émotionnelles.

De l'analyse minutée de ces tracés il ressort (1) que l'intestin participe aux émotions d'une manière différente chez le sujet normal et chez le névrosé; (2) que, parmi les stimulations déclenchées, les réactions intestinales permettent de distinguer trois catégories (a) les stimulations sensorielles simples, auxquelles l'intestin ne répond pas, (b) les émotions "psychiquement élaborées", qui se manifestent à l'intestin seulement au cours de leur première phase "perceptive" (c) les émotions "instinctives," qui modifient le fonctionnement intestinal pendant toute leur durée.

Les auteurs proposent une explication neurophysiologique de ces trois réactions differentes qui seraient déterminées par l'embrasement de circuits distincts au sein du système nerveux central. Ainsi s'éclaire le schéma physiopathologique de la maladie psychosomatique intestinale, qui serait due à une perturbation neuro-végétative d'origine centrale, elle-même de nature émotionnelle, agissant au niveau intestinal selon le mécanisme étudié par REILLY.

La conclusion montre que les thérapeutiques psychosomatiques, découlant logiquement de ces données, viseront à rééduquer la vie émotionnelle grâce à la combinaison des techniques psychothérapiques et des moyens d'action biologique sur le système nerveux central.

SUMMARY

THE authors consider three types of patient (1) patients presenting solely an emotional disorder persisting in an otherwise normal personality, (2) neurotic patients, and (3) psychopaths.

They discuss here the emotional manifestations observed in the first two groups only, for the third opens the as yet unsolved problem of the organicity of the psychopathic disorders, and would introduce yet another element of confusion into the psychosomatic problem.

The first case presented in this study belongs to the first group. A sigmoidographic recording taken while the patient was restful shows a harmonious series of waves of contractions, and differs considerably from another recording during which the patient underwent the various emotional stresses. The second case, a neurotic, also underwent different emotional stimulations, during which a sigmoidographic recording was taken.

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Detailed analysis of these recordings shows: (1) that the intestine reacts differently to emotion in normal and neurotic cases; (2) that the reactions of the intestine to emotional stimulants place the latter in three categories: (a) simple sensory stimulations to which the intestine does not react; (b) emotions producing psychological complications, whose only effect on the intestine occurs in the initial, perceptive phase; (c) "instinctive" emotions which modify the movement of the intestine throughout.

The authors put forward a neurophysiological explanation for these three reactions due to the activitation of distinctive circuits in the central nervous system. Some light is thus thrown on the physiopathology of psychosomatic intestinal illness, due to disorders, central in origin, of the automatic nervous system; these disorders, expressed emotionally, effect the intestine according to the mechanism studied by REILLY.

The conclusion of this study shows that the psychosomatic therapies, logically based on these data, aim at a re-education of the emotions by means of psychotherapy combined with the various biological means of action on the central nervous system.

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SOMATOTYPES AND PSYCHOSOMATIC DISEASES* †

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INTRODUCTION

IN their book *Varieties of Human Physique*, SHELDON and his co-workers (1940) introduced a method of somatotyping, which seemed to have several advantages over other methods of classification of human physique, formerly proposed.

FIG. 1.—A schematic twodimensional projection of the theoretical spatial relationships among the known somatotypes (SHELDON).

SHELDON distinguishes three extremes of bodybuild, each of which he considers to be an extreme manifestation of one of three postulated primary components, which together determine the shape of the human body. In each of these three extremes the two other components exert a minimum influence. These three components are given a quantitative estimate on a 7-point scale, the minimum rating being 1, the maximum 7. In this system the human bodybuild is indicated by three numerals; the first is an expression of what SHELDON calls *endomorphy*, the second of the so called *mesomorphy*, and the third of *ectomorphy*.

Extreme endomorphy is rated 7-1-1; it can be described as the highest degree of roundness and fatness of the body.

Extreme mesomorphy (1-7-1) indicates a square, bony, rugged-looking, muscular bodybuild.

Extreme ectomorphy (1-1-7) is marked by thinness, flatness and linearity.

These extreme ratings are only rarely found. The majority of individuals tend to group around a "midrange type" with balanced components, expressed as 4-4-4.

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With this method of somatotyping, SHELDON (1949, 1954) found 88 different types. On a special chart the position of any individual can be plotted in relation to the three extreme, "polar" types. In the centre of the chart is the somatotype 4-4-4, equidistant from the three extreme types.

Fig. 1 gives SHELDON's chart of somatotypes; Figs. 2, 3, and 4 are photographs of individuals with the three forms of more or less extreme bodybuild.

In general an individual is classified as an endomorph if the endomorphic component is rated higher than both the others; if the second component dominates, the individual is designated as a mesomorph; if the third component is higher than the other two components an individual is an ectomorph.

The present communication concerns a possible relationship of SHELDON's somatotypes to the occurrence of bronchial asthma, cholelithiasis, and peptic ulcer. SHELDON's method of somatoscopic somatotyping was followed throughout this investigation.

TABLE 1.—INTRAINDIVIDUAL DIFFERENCES OF SOMATOTYPE RATINGS
(On 61 individuals of both sexes, healthy and ill; all ages)

Differences between first and second rating	Components			Total
	I (endomorphic)	II (mesomorphic)	III (ectomorphic)	
$+1\frac{1}{2}$	1	2	—	3
$+1$	5	4	2	11
$+\frac{1}{2}$	19	13	11	43
0	23	29	23	75
$-\frac{1}{2}$	10	11	18	39
-1	3	2	5	10
$-1\frac{1}{2}$	—	—	2	2

TABLE 2.—INTERINDIVIDUAL DIFFERENCES OF SOMATOTYPE RATINGS
(On 59 individuals of both sexes, healthy and ill; all ages)

Differences between the ratings	Components			Total
	I (endomorphic)	II (mesomorphic)	III (ectomorphic)	
$+1\frac{1}{2}$	1	4	—	5
$+1$	5	10	1	16
$+\frac{1}{2}$	13	15	5	33
0	21	18	27	66
$-\frac{1}{2}$	15	11	19	45
-1	3	1	6	10
$-1\frac{1}{2}$	1	—	—	1
-2	—	—	1	1

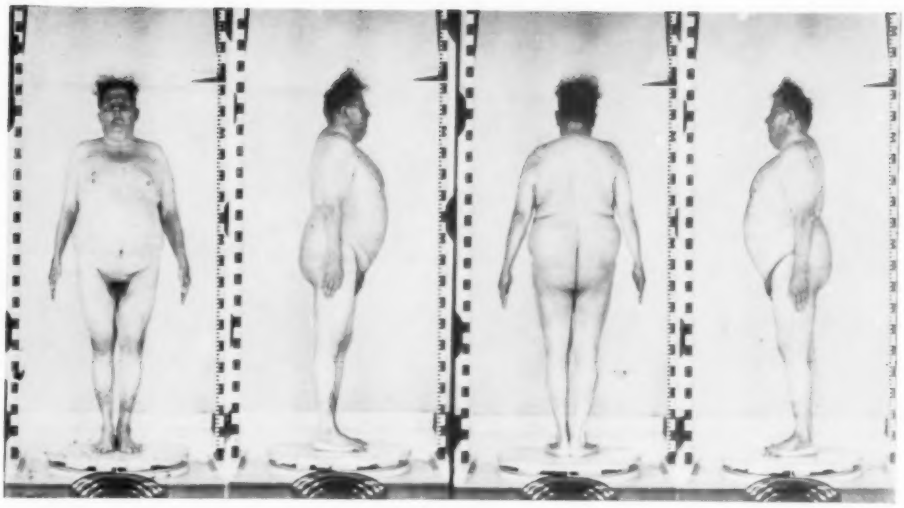

FIG. 2.—Strong endomorph

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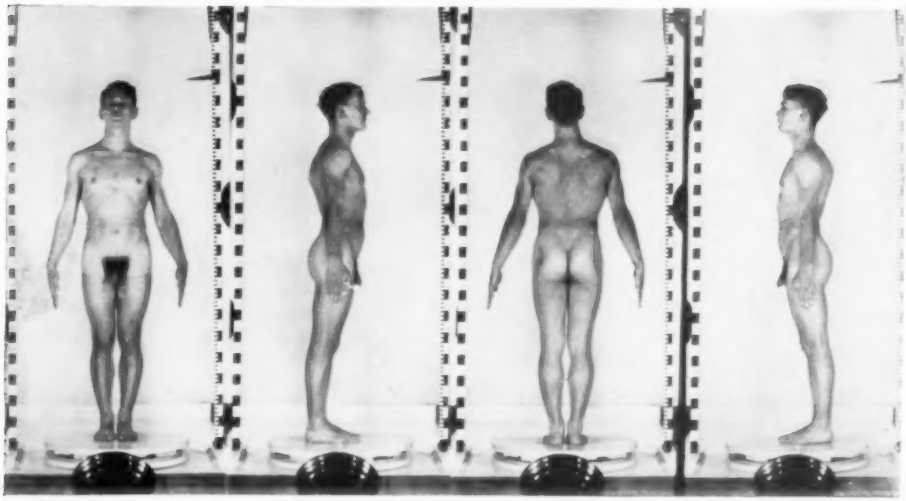

FIG. 3.—Strong mesomorph

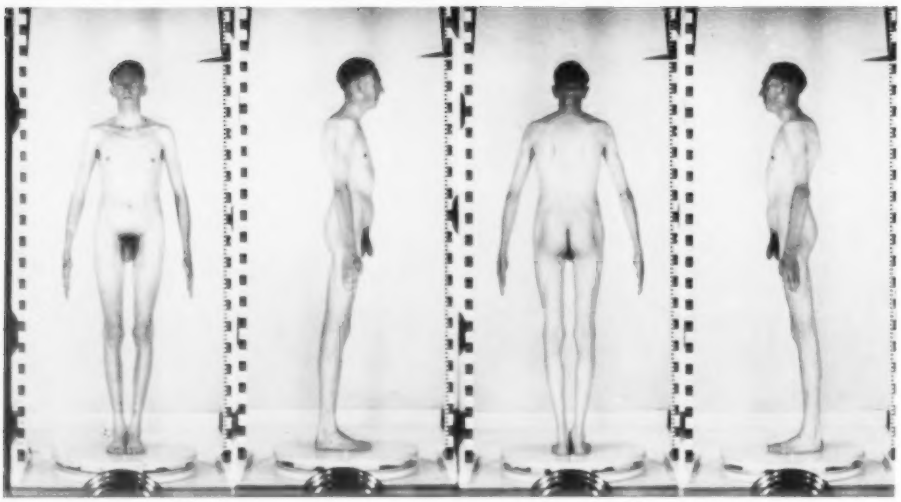

FIG. 4.—Strong ectomorph

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RELIABILITY OF THE SOMATOSCOPIC SOMATOTYPING

In order to test the reliability of our somatotyping we compared our ratings of a group of 61 individuals on two occasions with a time interval of several months. In Table 1 the differences of the component ratings are given, from which it may be seen that in 157 out of 183 (=86%) the ratings did not differ more than half a unit; this is a rather high degree of agreement and a satisfactory proof for the consistency of the rating of the same individual by the same investigator.

Dr. J. M. TANNER (London) kindly co-operated with us in somatotyping 59 individuals of the same group from photographs we had sent him. The differences of our ratings and his are given in Table 2. In 144 out of 177 (=81%) his and our component ratings did not differ more than half a unit. This high degree of agreement is an indication of the sufficient reliability of the rating of the same individual by two investigators using SHELDON's method.

TABLE 3.—MEAN VALUES OF THE COMPONENTS IN THE SOMATOTYPE

	A. Men			
	SHELDON	BROUWER		
Component	4000 young men	(a) 91 healthy men	(b) 247 patients	338 men (a + b)
I. Endomorphy	3·20 $\sigma = 1{\cdot}2$	3·19 $\sigma = 0{\cdot}67$	3·22 $\sigma = 0{\cdot}80$	3·21 $\sigma = 0{\cdot}80$
II. Mesomorphy	3·77 $\sigma = 1{\cdot}2$	3·94 $\sigma = 0{\cdot}86$	3·56 $\sigma = 0{\cdot}83$	3·67 $\sigma = 0{\cdot}83$
III. Ectomorphy	3·53 $\sigma = 1{\cdot}3$	3·43 $\sigma = 0{\cdot}67$	3·60 $\sigma = 0{\cdot}93$	3·56 $\sigma = 0{\cdot}93$
Average somatotype	3-4-3½	3-4-3½	3-3½-3½	3-3½-3½
	B. Women			
	SHELDON	BROUWER		
Component	2500 young women	(a) 54 healthy women	(b) 189 patients	243 women (a + b)
I. Endomorphy	3·61 $\sigma = 1{\cdot}3$	4·70 $\sigma = 0{\cdot}64$	4·50 $\sigma = 1{\cdot}12$	4·54 $\sigma = 1{\cdot}04$
II. Mesomorphy	3·24 $\sigma = 1{\cdot}2$	2·95 $\sigma = 0{\cdot}62$	2·63 $\sigma = 0{\cdot}54$	2·70 $\sigma = 0{\cdot}58$
III. Ectomorphy	3·64 $\sigma = 1{\cdot}3$	2·88 $\sigma = 0{\cdot}74$	3·16 $\sigma = 1{\cdot}16$	3·11 $\sigma = 1{\cdot}09$
Average somatotype	3½-3-3½	4½-3-3	4½-2½-3	4½-2½-3

HEALTHY INDIVIDUALS AND PATIENTS OF BOTH SEXES

The investigation was carried out on 581 individuals: 91 healthy men and 247 male patients, totalling 338 men, and 54 healthy women and 189 female patients, together 243 women.

As "healthy" individuals were chosen persons (a) who had not consulted their family doctor for the last five or more years, (b) volunteers consisting of students of the Municipal University and the Academy of Physical Education of Amsterdam, and (c) relatives of patients who had never suffered from any serious disease and had been completely well for the last few years. Physical examination of these individuals revealed no objective signs of disease. Table 3 gives the means and standard deviations of the three components of the somatotype for these groups of healthy individuals and patients, together with those of SHELDON.

The following conclusions may be drawn from these figures:

(1) The average somatotype of our 338 men does not differ significantly from that of SHELDON's 4000 young men.

(2) An apparent difference in average mesomorphy is due to the fact that the figure 3·67 had to be rounded off downward to $3\frac{1}{2}$; 3·77 upward to 4.

(3) Judged by the "Student-*t*-test" there is a statistically significant difference between the components of the average somatotype of our 243 women and those of SHELDON's 2500 women; the Netherlands women are more endomorphic, less mesomorphic, and less ectomorphic than the American group.

(4) The standard deviations of all three components in our groups are markedly smaller than in SHELDON's. This might point either to a less frequent occurrence of extreme values of the three components in our material, or to the fact that we were possibly less inclined to award high values to the components in general. After the appearance of the *Atlas of Men* (1954) in which SHELDON presents photographs of 1175 examples of the 88 known somatotypes, it became clear that he has indeed come across some extreme somatotypes which we have not seen among our material.

(5) From SHELDON's findings as well as from our own it is most obvious how markedly the sex difference expresses itself in the average somatotype. Women are more endomorphic, less mesomorphic and (at least in the Netherlands) less ectomorphic than men. In our groups the sex difference of the average somatotype displays itself significantly in all three components. Fig. 5 shows the distribution of our 339 men on the somatotype chart. It is clear that there is a spread over all six sectors, with a crowding in the two mesomorphic sectors and in the sector of mesomorphic ectomorphy. These sectors can be rightly designed as the "male territory." Fig. 6, showing the distribution of the 243 women, gives quite a different picture, viz. a crowding in the other three sectors, especially in the two endomorphic sectors (the "female territory"). The significant differences in the distribution of the sexes are well illustrated in these somatotype charts.

BRONCHIAL ASTHMA

Among 405 Oxford undergraduates PARNELL (1954) found 19 young men who gave a history of asthma; 14 of these were ectomorphs. On the chart of somatotypes in his paper (Fig. 7) appear 21 individuals, 15 of whom are located in the ectomorphic sectors. PARNELL concluded that "ectomorphs have a pronounced disposition to bronchial asthma, compared with other types of young man."

Among our 46 male individuals with bronchial asthma we found only 11 ectomorphs, 8 endomorphs, 15 mesomorphs, and 12 midrange types (c.i. types in which none of the three components

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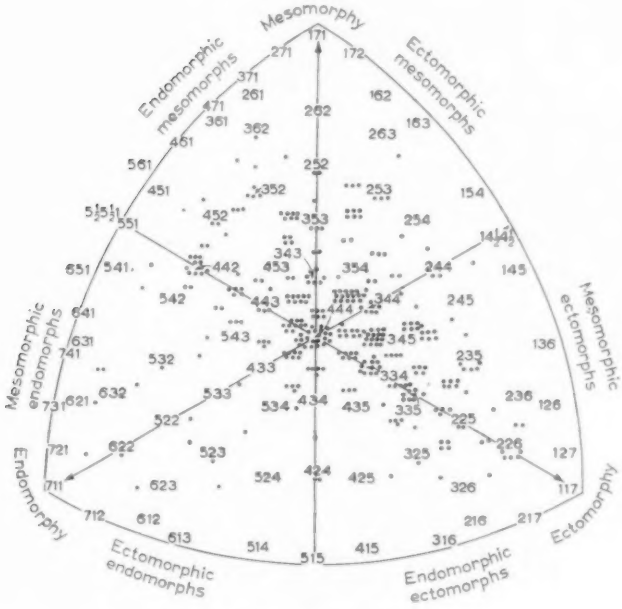

FIG. 5.—Distribution of somatotypes of 339 men.

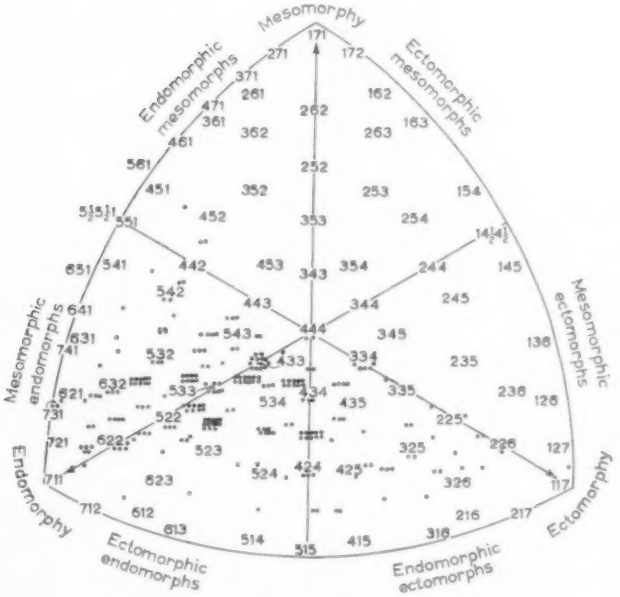

FIG. 6.—Distribution of somatotypes of 243 women.

distinctly predominate). These individuals are distributed on the somatotype chart (Fig. 8), more or less in conformity with our controls. There is certainly no tendency to the ectomorphic sectors. Among 20 female asthmatics we found 8 predominantly ectomorphic, 11 endomorphic and 1 mesomorphic. This means 40% ectomorphs against 17½% in our control group. The asthmatic women penetrate to some degree into the ectomorphic sectors, but as a group they are not predominantly ectomorphic (Fig. 9).

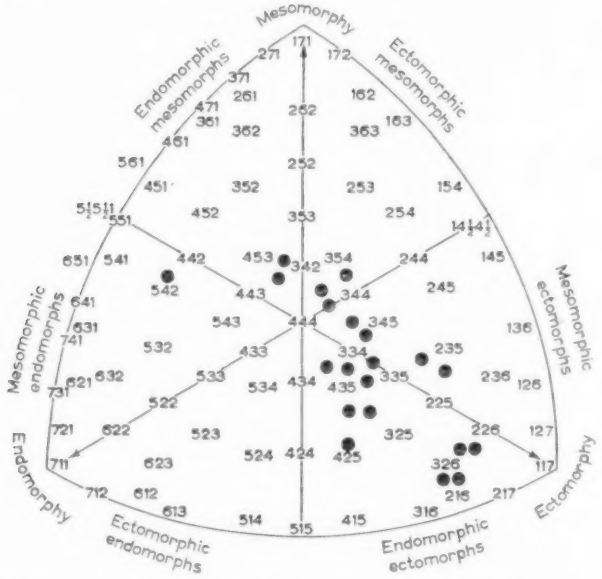

FIG. 7.—Distribution of somatotypes of 21 young men with bronchial asthma (PARNELL).

In order to find out if bronchial asthma, acquired early in life, might have influenced somatotype and growth, we divided our male asthmatics (all adults) into two groups.

Group A: asthma acquired before the age of 25 (at an average age of 10 years).

Group B: asthma acquired later in life (at a mean age of 43).

There was no significant difference in mean somatotype, stature or shoulder breadth (biacromial diameter) between the two groups. Only the pelvic breadth (bi-iliac diameter) showed a small difference in favour of group B, significant only on the 5% level.

From these findings we conclude:

(1) Among our female asthmatics there is a considerably higher percentage of ectomorphs than among the controls. Nevertheless the proportion of endomorphs is still the highest (of the three) in this group.

Our female asthmatic patients can therefore not be designated as "ectomorphic," but as a group there is some shift to the ectomorphic sectors, compared to the control group.

(2) Among our male asthmatics there is no predominance of ectomorphs, when compared to the bodybuild of healthy controls. Therefore our work does not support PARNELL's conclusion "that ectomorphs have a pronounced disposition to bronchial asthma." Our results are more in conformity with the findings of MATTHEW YOUNG (1933) who found no significant differences between asthmatic schoolchildren and controls, and with those of REES in asthmatics (1956).

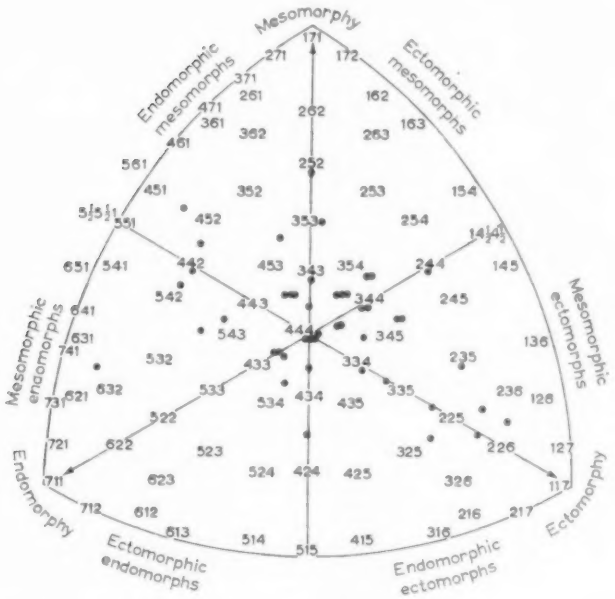

FIG. 8.—Distribution of somatotypes of 46 men with bronchial asthma.

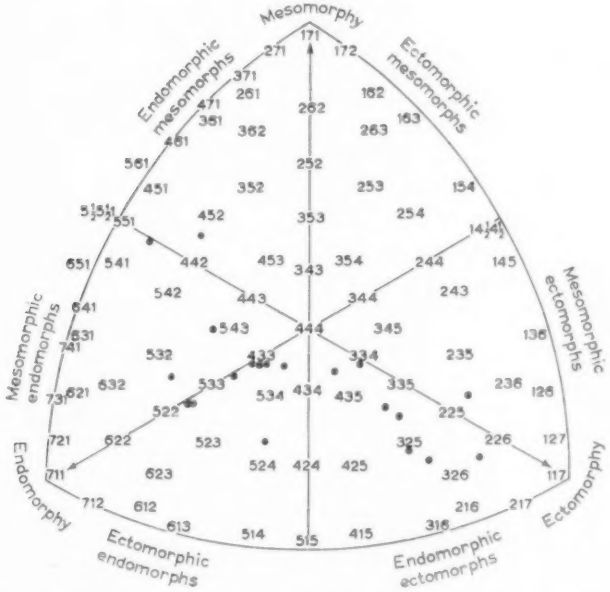

FIG. 9.—Distribution of somatotypes of 20 women with bronchial asthma.

(3) Asthma acquired early in life did not appear to have influenced the mean somatotype, stature and shoulderbreadth. The *pelvic* breadth may have been influenced to a slight degree.

CHOLELITHIASIS

DRAPER's observations (1944) on gall-bladder patients led him to denote a "gall-bladder type": individuals with a thick, round stocky build. SHELDON (1940, 1949) confirmed DRAPER's findings. "Victims of gall-bladder disease, about four-fifths of whom are women, are conspicuously of endomorphic predominance, with the second component stronger than the third. That is to say, they are usually mesomorphic endomorphs." In KRETSCHMER's terminology they could be designated as pyknic individuals. According to DUPERTUIS (1944) the average somatotype of gall-bladder patients is 4-4-2½ for men, and 5-3½-2 for women.

Among our 25 *female* gall-stone patients the mean somatotype was: 5-2½-2½. They appeared less mesomorphic and slightly more ectomorphic than DUPERTUIS reported: as far as endomorphy is concerned our findings are in accord with his and SHELDON's description. We found 72% predominantly endomorphic, but in only 52% the second component stronger than the third.

On the somatotype chart SHELDON's distribution of 37 female gall-bladder patients shows that they occupy principally the peripheral zones of the "mesomorphic endomorphs and the endomorphic mesomorphs." These women must have been of an unusually "strong" build, as did not occur in our female patients, even if we take into consideration the fact that SHELDON somatotyped these female patients against women's standards (1954).

The distribution of our 25 female gall-stone patients on the chart (Fig. 10) shows them all in the typical female territory, mostly in the two endomorphic sectors, very different from SHELDON's distribution and much more like healthy women; 18 of the 25 are predominantly endomorphic; of these 18, 12 are mesomorphic endomorphs, but the degree of mesomorphy is not very pronounced, all but one having a mesomorphy rating of less than 4.

Summarizing these results we observed a preponderance of endomorphy, but not significantly more than in the healthy female control group, and there was no marked predominance of mesomorphy over ectomorphy: these women as a group might be labelled slightly mesomorphic endormorphs; in KRETSCHMER's terminology they may be described as pyknics.

Our observations confirm that in female gall-stone patients the mesomorphic endomorphs (pyknic types) predominate. Especially is their endomorphy predominant, but this is as much a characteristic of the group of all women, and therefore certainly not typical of cholelithiasis.

PEPTIC ULCER

In their work on constitutional aspects of disease DRAPER and his co-workers (1924, 1944) pointed out especially the differences in bodybuild between gall-bladder and peptic-ulcer patients. According to their findings peptic-ulcer individuals showed more linearity of build. Male duodenal-ulcer patients displayed a mean somatotype of 3-4½-3. They were therefore predominantly mesomorphic, but the authors mention emphatically a considerable spread of the somatotypes.

SHELDON (1940) describes a low rating for the first component in both duodenal- and gastric-ulcer patients; they lack endomorphy, are endopenes. Of the other two components the second seems to predominate over the third, but in a heavy, "meaty" population SHELDON's distribution of 92 men (Fig. 11)* and 25 women with duodenal

* Courtesy of Harper & Brothers, New York.

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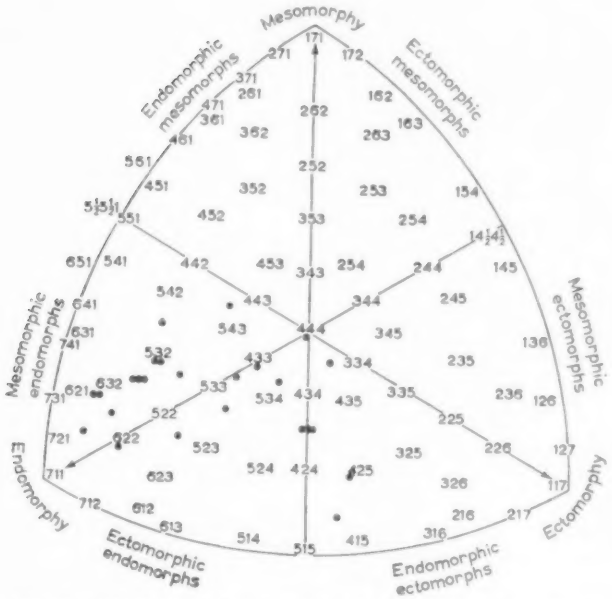

FIG. 10.—Distribution of somatotypes of 25 women with cholelithiasis.

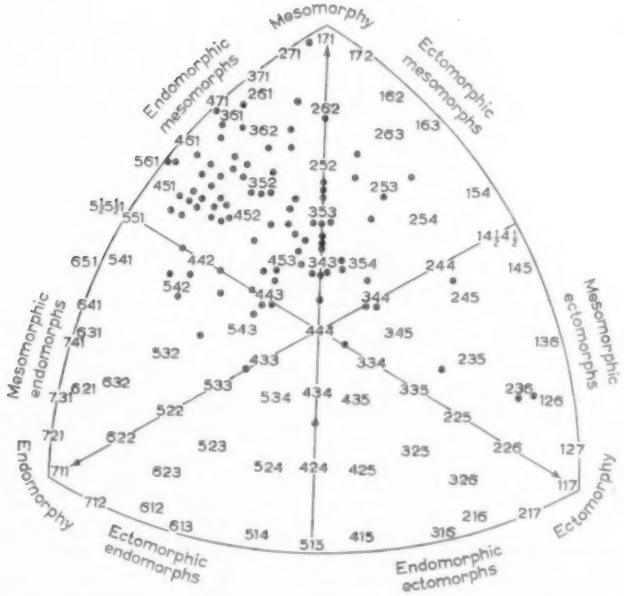

FIG. 11.—Somatotype distribution for duodenal ulcer. 92 men (SHELDON).

ulcer shows a strong tendency towards endomorphic mesomorphy, which means a heavy, stocky build—*not* endopenia! In a very thorough investigation of peptic-ulcer patients with carefully chosen controls, using STRÖMGREN's Index and the basic indices of an index method suggested by HJORTSJÖ, WRETMARK (1953, 1954) found in conformation with CATSCH that duodenal ulcer seems to occur particularly in individuals of tall-narrow (leptosomatic) bodybuild. He also showed a relationship between bodybuild and the course of duodenal ulcer: "the more tall-narrow the bodybuild, the worse the course."

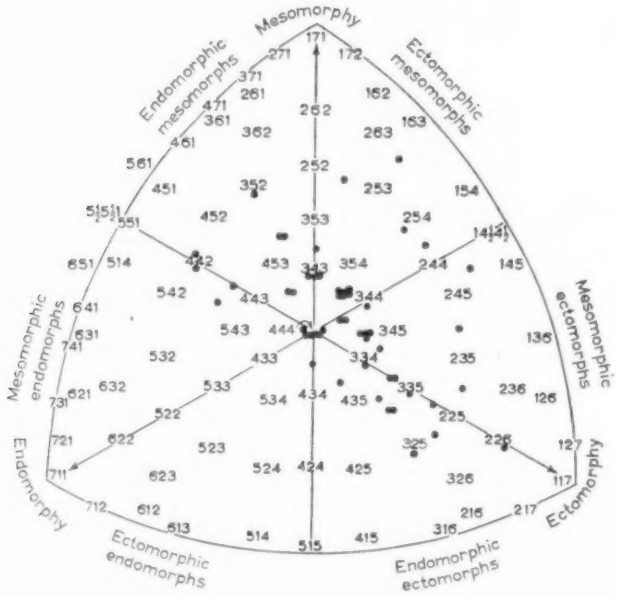

FIG. 12.—Distribution of somatotypes of 53 men with peptic ulcer.

If we compare the distribution of SHELDON's peptic-ulcer and gall-bladder patients (1949), not much is left of the difference between these groups, as stressed by DRAPER! Neither is it possible to reconcile one and the other with the leptosomatic build as found by CATSCH and WRETMARK.

Among our 53 men with peptic ulcer there were 38 duodenal ulcer patients; in 5 cases the localization was "juxta-pyloric"; there were 10 cases of gastric ulcer. The mean somatotype of the 38 duodenal-ulcer individuals was: 3-3½-3½; the 10 men with gastric ulcer had a mean somatotype of 3-4-3½. The difference in mesomorphy between the two groups was nearly significant on the 1% level in favour of the gastric ulcer group.

Our 53 male peptic-ulcer individuals (Fig. 12) do not show any predilection for endomorphic mesomorphy; they have on the whole a general male distribution and may seem to be slightly inclined to the ectomorphic sectors. The distribution of duodenal-ulcer patients seems to point to a slightly more pronounced ectomorphic tendency than that of the gastric-ulcer patients. Ectomorphy as high as 5 or 6 scale points occurred in our duodenal-ulcer patients but not in the gastric-ulcer subjects. With reference to the clinical course of peptic ulcer, there were 18 cases with acute signs of haemorrhage or perforation, and 28 which ran a more chronic course.

The more acute cases had a mean somatotype of 3-3½-3½; for the more chronic cases the average

rating was: 3-4-3½. The 18 acute cases belonged for 61% to the midrange group, 28% were ectomorphs, only 5½% were mesomorphs.

The 28 chronic cases belonged for 46% to the midrange group, 18% were ectomorphs, 25% mesomorphs.

Summarizing it can be said that the work of DRAPER and SHELDON suggested an "ulcer type" of predominantly mesomorphic, respectively endomorphic-mesomorphic build, in contrast to that of WRETMARK and CATSCH, who both discovered a more leptosomatic bodybuild.

These different results can—at least partly—be traced to

(1) differences in methods of investigation, both in techniques used and in choice of controls;

(2) differences in the anthropological composition of the populations in which the investigations were carried out;

(3) differences in terminology.

As far as our findings are comparable with those of the above mentioned workers, we come to the following conclusions:

(1) Our ulcer patients do not show the mesomorphic build as DRAPER reported, nor the endomorphic mesomorphy as SHELDON's figures suggest.

(2) In conformity with WRETMARK and CATSCH our duodenal ulcer patients are more inclined to ectomorphy (leptosomatic build) although they do not differ significantly in ectomorphy both from healthy controls and from our group of all men.

(3) If there is a difference in bodybuild between gastric ulcer and duodenal ulcer patients, as some investigators suggest, this appears only slightly in our material.

(4) As to the clinical course of peptic ulcer, it seems as if the midrange types and the ectomorphic types go more often with a complication like acute haemorrhage or perforation than other bodytypes do.

CONCLUSIONS

(1) The anthroposcopic determination of the somatotypes according to SHELDON can be carried out with satisfactory intra- and inter-individual reliability.

(2) Somatotyping, especially the determination of the order of predominance of the three components, becomes the more difficult as the somatotype approaches the so-called mid-range group.

(3) Gross departure from the normal nutritive status, muscular atrophy, as caused by illness and inactivity, deformities, change of posture, caused by maladies and so on, may (as in not yet fully grown individuals) severely interfere with the estimate of the somatotype, and may even make it impossible to come to a reliable estimate. All this diminishes considerably the importance of this method for the research of clinical problems.

(4) In all our groups *sex difference* is most striking, expressing itself both in mean somatotype and somatotype distribution. Hence it follows, that one has to be very cautious, when judging the results of somatotypological research (especially in clinical work), if no separation has been made between both sexes.

(5) No great value can be attached to a mean somatotype without knowledge of the somatotype distribution. Differences in somatotypes between different diseases express themselves best in the *distribution* of the types. The wide distribution of somatotypes of our patients with diseases thus far investigated, makes for caution in the use of expressions such as "ulcer type," "gall-bladder type" and suchlike terms.

(6) Our investigation has not yielded such results as might have been expected from the work of other investigators. The differences in somatotype, which we found between patients with asthma, cholelithiasis, and peptic ulcer on one hand and controls on the other, were disappointingly small, if we compared groups of the same sex.

7. The desirability, indeed the necessity, to be able to compare the results of the work of different investigators into constitutional problems, demands a more uniform working method, which need not necessarily be that of SHELDON. If a well-established, workable typology were generally excepted, the old problem of bodybuild and psyche could also be investigated in a more exact manner.

SUMMARY

The author reports the results of an investigation of healthy individuals and patients, consisting of 338 men and 243 women. After having established that the anthroposcopic determination of the somatotypes according to SHELDON can be carried out by two investigators with satisfactory intra- and inter-individual reliability, the relation between somatotype and the occurrence of bronchial asthma, cholelithiasis, and peptic ulcer was studied and the results compared with those of other investigators.

The sex difference appeared to influence the somatotype more than the difference in bodybuild between groups of patients with these three diseases.

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PEPTIC ULCER AND ALCOHOLISM

A STATISTICAL STUDY IN FREQUENCY, BEHAVIOUR, PERSONALITY TRAITS, AND FAMILY OCCURRENCE*

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THE present investigation was initiated by the clinical impression that alcoholism and peptic ulcer often occur in the same patient. In addition, it seemed to us that alcoholics often have near-relatives who suffer from peptic ulcer. We became interested in trying to verify these observations and to investigate whether any possible relationship exists between the two diseases, and if so, what kind of relationship? Do the two diseases have anything in common in their pathogenetic pattern?

Our aim has not been to make a detailed study of the dynamics behind these patterns, but to study a number of data which are easily obtained and easily controlled, which might bear on the relevance of our questions, and perhaps lead to a deeper understanding of the two conditions. If the results suggest that these data are relevant in answering our questions, there may be reason to expand and intensify the investigation in different ways. At the present stage, the work may be regarded as a pilot study.

During the investigation it became clear that alcoholics with peptic ulcer, or with near relatives suffering from peptic ulcer constituted a separate group, which differentiated itself from other alcoholics in several respects. We therefore decided to describe the characteristics of this group and compare them with those of other alcoholics.

There is little to be found in the literature concerning the relationship between peptic ulcer and alcoholism. An investigation by ENGESET in Norway (unpublished), revealed in a series of 419 alcoholics, 74 patients who have or have had peptic ulcer. This frequency of 17·7% was compared with the frequency of peptic ulcer in the normal population (alcoholics excluded), which was found to be 12·8%. It may well be, however, that this difference in frequency is due to chance. ENGESET demonstrated, however, a very striking difference between peptic-ulcer individuals with and without alcoholism; the former having been subjected to gastric resection in 31% as compared with 12% among the latter.

We have investigated the frequency of alcoholism in a male peptic-ulcer series in a town in the middle of Sweden (collected by WRETMARK, 1953). This frequency was 8·3%, while the same frequency in a quite comparable control series was 7·1%. These figures agree well with those of ESSEN-MÖLLER (1956), who reports the frequency of alcoholism in males to be 9·3% in a rural district in south Sweden. An argument against the validity of all these figures is that they may chiefly reflect the frequency of chronic alcoholism with apparent physical or mental deterioration, while other stages of the alcoholic disorder may have escaped the examiners' attention.

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The possibility of a relationship between peptic ulcer and alcoholism on the dynamic level has been discussed by KAPP, ROSENBAUM, and ROMANO (1947). Out of 20 peptic-ulcer cases, 9 were complicated by alcoholism or criminality. As this can hardly be the typical proportion of such disturbances in peptic-ulcer individuals, their series must have been selected in some special way. These patients were studied very intensively, and the authors suggested that the alcoholism might be regarded as an expression of the same parasitic-receiving tendencies, which constitute one of the poles in the unconscious conflict, described by ALEXANDER (1934) as characteristic of the peptic-ulcer individual.

MATERIAL

The material consists of 130 consecutive cases of alcoholism seen at the special out-patient clinic for alcoholic disorders attached to the psychiatric clinic at the University Hospital of Lund. All were males.

The administration of this clinic is in the hands of a doctor employed exclusively for this work. Patients with all kinds of alcoholic problems are received and the clinic has now been functioning for two years. During this time it has become fairly well known in the local district it has to serve. Some patients come on their own initiative, others on the request of general practitioners or temperance boards. A smaller number have been forced to come to the clinic by a temperance board or other social authority. Thus, many patients have come on their personal initiative, while others have come into contact with the clinic as a result of pressure from their environment. As a result of the selection described, the series cannot be supposed to be representative of that part of the population which has fallen victim to alcohol. Nevertheless, it is probably typical of those patients who are seen in an out-patient clinic of this kind.

The 130 male alcoholics had an average age of 42·3 years, with a range of 18–77 years. The series was divided into one group of individuals who had, or had had, peptic ulcer (u-group), a second group of those who had family members (parents, siblings) with this disease (uf-group), and finally a third group of the other alcoholics (o-group). For inclusion in the u-group, an earlier radiological demonstration of an ulcer crater (21 cases) or a typical history, including haematemesis or malaena (3 cases), was required. By "the family" in the uf-group is meant parents and siblings.

TABLE 1.—AGE AND DURATION OF ALCOHOLISM IN YEARS

	n	Average age	Age range	Duration of alcoholism in years
u-group	24	43·0	26–61	12·8
uf-group	25	43·3	25–57	11·0
o-group	81	41·9	18–77	12·3
Total material	130	42·3	18–77	12·1

The groups are comparable as to age and duration of alcoholism.

Table 1 gives the ages in the different groups, and the duration of alcohol abuse. 56% came from a typical rural district and the rest from rather small towns. The geographic distribution was identical in all groups.

METHODOLOGY

The patients have been psychiatrically examined in the out-patient clinic; most of them have been seen twice or more, and in all cases we had information from relatives and social workers. All explorations were made for the purpose of the present investigation.

RESULTS

Frequency. From Table 1 it can be seen that 24 of the 130 cases of alcoholism had, or had had, peptic ulcer. This frequency (18·5%) is higher than could be expected, as WRETMARK (1953) reports a frequency of only 8·1% in a Swedish population of 520 males chosen at random. The difference, which is statistically significant on the 1% level, is the more striking, as the average age in the normal population was higher (50·4 years) than in the present series, and the former consisted of town residents, i.e. were selected from a population with a probably higher ulcer frequency than that expected in a mixed rural and urban population.

No less than 7 of the 24 peptic-ulcer cases had been operated upon, and had had a gastric resection. This frequency (29·2%) is about the same as that reported by ENGESET.

Ratio between duodenal and gastric ulcer. The ratio between duodenal and gastric ulcer seems to vary with time and cultural pattern. Figures to compare with the findings in the present series are those obtained by IHRE and MÜLLER (1943) and by MALMROS and HIERTONN (1949). The former investigators found a ratio of 3·5 : 1 in a Stockholm series of both males and females; the latter reported the ratio to be 2·6 : 1 in a male series covering an urban as well as a rural population living in the receiving area of a central hospital in the middle of Sweden. WRETMARK (1953) investigated the same area, where he found the ratio between duodenal and gastric ulcer to be 2·3 : 1 in a series comprising 910 male peptic-ulcer individuals. When this series was divided into an urban and a rural part, the ratio for the former was found to be 4·0 : 1 as compared with 1·7 : 1 for the latter.

As the present series shows a similar distribution between urban and rural districts, the expected ratio might be around 2·3–2·6 : 1. Among the 24 peptic-ulcer cases were 3 in which it was impossible to decide if the ulcer should be classed as duodenal or gastric. 18 cases had a duodenal (2 of these had an additional gastric ulcer) and 3 had a gastric ulcer. The ratio duodenal : gastric ulcer is then 7·0 : 1 in the present series. Even if the number of cases is small, the discrepancy between the ratio expected and the ratio observed is of some interest.

Reason for reference to the clinic. The manner in which the patients came in

TABLE 2.—REFERRALS TO THE OUT-PATIENT ALCOHOLIC CLINIC

Referral	u-group			uf-group			o-group		
	Observed		Expected	Observed		Expected	Observed		Expected
	n	%	*n*	*n*	%	*n*	*n*	%	*n*
On own initiative	11	45·9	5·9	9	36·0	6·1	12	14·8	19·9
On doctors request	4	16·6	5·9	6	24·0	6·1	22	27·2	19·9
From temperance board	9	37·5	12·2	10	40·0	12·8	47	58·8	41·2
Total	24			25			81		

$df = 4$ $\chi^2 = 19{\cdot}58$ $P < 0{\cdot}001$

contact with the alcoholic out-patient clinic revealed some remarkable differences between the groups. These are shown in Table 2.

Among those who have been referred to the clinic on request of practitioner there are also a few who were brought to the clinic by Alcoholics Anonymous. From Table 2 it can be seen that the cases in the u-group have come more often "on own initiative" than those in the o-group. The uf-group holds an intermediate position in this respect, but is closer to the u- than the o-group. Among the alcoholics who have come on their own initiative, the frequency of peptic ulcer was 34·4 %. This may be due to various factors, but one explanation may be found in the type or stage of alcoholism.

Stage of alcohol disease. In the classification of stages of alcoholism we have followed the work of BONHOEFFER (1901), BOWMAN and JELLINEK (1942), and ÅMARK (1951), particularly the version given by the latter in his monograph of 1951. Accordingly, the different stages have been termed: (1) Chronic alcoholism; (2) alcohol addiction; (3) alcohol abuse.

By chronic alcoholism is meant that physical and/or mental deterioration can be detected in the patient even after the acute intoxication has ceased. Alcohol addiction implies that the patient is in a stage of dependence on alcohol so that he, after a smaller dose ("trigger-dose"), is unable to interrupt the consumption unless he is forced to do so by factors beyond his own control. The third stage of alcohol abuse is represented by individuals whose drinking habits have had some unfavourable social consequences in their own or others' opinion, in spite of the absence of physical or mental deterioration or the characteristics of addiction.

The stages of alcoholism are shown in Table 3.

TABLE 3.—STAGE OF ALCOHOLISM

Stage of alcoholism	u-group			uf-group			o-group		
	Observed		Expected	Observed		Expected	Observed		Expected
	n	%	*n*	*n*	%	*n*	*n*	%	*n*
Chronic alcoholism	9	37·5	12·0	7	28·0	12·5	49	60·5	40·5
Alcohol addiction	15	62·5	9·8	15	60·0	10·2	23	28·4	33·2
Alcohol abuse	0	0·0	2·2	3	12·0	2·3	9	11·1	7·5
Total	24			25			81		

$df = 4$ $\chi^2 = 15{\cdot}81$ $0{\cdot}001 < P < 0{\cdot}01$

It can be seen from Table 3 that the cases in the u- and uf-groups are frequently alcohol addicts, but that symptoms of chronic alcoholism are less common among them. The difference in frequency of chronic alcoholism in the u- and o-groups is significant only at the 5 % level, while the other differences are significant at the 1 % level. These differences cannot be ascribed to such factors as age or duration of excessive alcohol consumption, as the groups are quite comparable in these respects (see Table 1). Furthermore, if it is supposed that the frequency of peptic ulcer in the normal population (8·1 %) should be valid also for chronic alcoholics, an ulcer should be expected in 5·3 persons out of the 65 in our series belonging to this category. Among the 65 chronic alcoholics there are in fact 9 who have suffered from a peptic ulcer; a number which does not significantly deviate from the expected one. In view

of this, the excessive number of peptic-ulcer patients who have been classed as alcohol addicts seems to be even more striking.

These findings may suggest that individuals belonging to the u- and uf-groups respectively have a relatively higher resistance against the development of organic defects caused by alcohol. Another possible explanation would be that, in spite of their dependence on alcohol, they were capable of limiting their consumption.

Sequence of diseases. An objection which can be raised against an investigation of this kind is centainly that a peptic ulcer might be secondary to the attack of alcohol on the mucous membrane. The figures given for those patients who themselves do not suffer from peptic ulcer, but whose relatives do, seem to argue against such a simple relationship. In this connection it is also of interest to investigate the sequence of the initial onset of the diseases. Among our 24 peptic-ulcer cases, 14 (58%) had their ulcer before the onset of any abnormal alcohol consumption. In 5 cases (20%) the sequence could not be determined. Only 5 (20%) reported the onset of excessive drinking before there was evidence of alimentary disturbance.

These figures do not give the impression that the onset of the ulcer disease could be attributed to any local attack or any nutritional deficiency secondary to alcohol abuse. This is, of course, no proof of the absence of a direct relationship of this kind: but if such local factors should be responsible for the development of ulcer, it is difficult to understand why the great majority of ulcers in this series are localized in the duodenum. To the best of our knowledge, dietary factors are probably of greater importance in the genesis of gastric ulcer.

In the present series there are, in fact, several cases suggesting an alternation of the diseases, a "syndrome-displacement" rather than a direct causal relationship between the diseases.

Motive for alcohol consumption. In the estimation of the patients' motive for alcohol consumption, we have mainly relied on their own statements. But these have also been weighed against information given by family members or social workers. In addition, the investigators' own opinion of the motive has been considered, which implies that a subjective element with an uncertain halow effect has entered into the estimations.

For the sake of simplicity we have only tried to make a distinction between motives dominated by nervousness, restlessness, feelings of insecurity, tension, anxiety, and other motives. The first group of motives are referred to as "nervousness." The results are seen in Table 4.

TABLE 4.—MOTIVE FOR ALCOHOL CONSUMPTION

Motive	u-group			uf-group			o-group		
	Observed		Expected	Observed		Expected	Observed		Expected
	n	%	*n*	*n*	%	*n*	*n*	%	*n*
Nervousness	16	66·7	8·5	15	60·0	8·9	15	18·5	28·7
Other reasons	8	33·3	15·5	10	40·0	16·1	66	81·5	52·3
Total	24			25			81		

$df = 2$ $\chi^2 = 26{\cdot}88$ $P < 0{\cdot}001$

It should be noted that "nervousness" is the predominating motive in the u- and uf-groups, which are quite similar in this respect, while the individuals in the o-group as a rule have taken to injurious drinking for other reasons.

Nervous symptoms and character formation. For several reasons, the presence of nervous symptoms existing before the onset of alcohol abuse was difficult to ascertain. In the u- and uf-groups more individuals reported signs of neuroticism in childhood than in the o-group, but did not differ from this group in any significant way.

It was easier to discern some striking tendencies in the attitude or habitual behaviour pattern. In

accordance with the experiences of many previous authors (VON BERGMAN 1913*b*, 1918; ALVAREZ, 1929, 1930, 1932; CUSHING, 1931; HARTMAN, 1933) we looked for such traits as inability to relax, a tendency to become worried, and a more or less obsessional striving for perfectionism, social or financial security and success, or a general gain of prestige. We characterized an individual as "over-ambitious" if strivings of this kind were easily recognized in his attitute or behaviour.

A clinical estimate of these tendencies is summarized in Table 5. From Table 5 it can be seen that these tendencies are distributed in a similar way among alcoholics in the u- and uf-groups, and that these groups differ remarkably from the o-group. The worried, over-ambitious, and tense attitude is frequently found among the former groups, but is very rare among the latter. It is particularly interesting to note that this attitude is just as characteristic of those who belong to the uf-group as of those in the u-group.

The results described so far suggest that the u- and uf-groups are comparable in several important ways and that they differ fundamentally from other alcoholics in these ways.

TABLE 5.—FREQUENCY OF NEUROTIC TRAITS IN DIFFERENT GROUPS OF ALCOHOLICS

Neurotic traits	u-group (total 24)		uf-group (total 25)		o-group (total 81)		Diff. u-uf CR	Diff. u-o CR	Diff. uf-o CR
	n	%	*n*	%	*n*	%			
Unable to relax	18	75·0 ± 9·0	16	64·0 ± 9·8	9	11·1 ± 3·5	0·8	6·6**	5·1**
Over-ambitious	10	41·7 ± 10·3	16	64·0 ± 9·8	7	8·6 ± 3·1	1·6	3·1**	5·4**
Worried	16	66·7 ± 9·8	15	60·0 ± 10·0?	6	7·4 ± 2·9	0·5	5·8**	5·6**

We have now given an account of differences in behaviour and attitudes which it has been possible to record after only a superficial contact with the clientele. Some other findings, which may have a bearing on the relationship between the two diseases on a more genetic level, will now be reported.

Position among siblings. Family factors in peptic-ulcer disease as well as in alcoholism has been a matter of considerable interest in the literature.

The size of the family and the position among siblings in particular have been studied by several authors, as these factors may be important for the psychological development of the individual. However, the results reported are controversial. RUESCH (1948) stated that patients with duodenal ulcer tended to be the younger children of the family, separated from their next older or younger sibling by a space of several years, a gap which isolated them from the rest of the children. KELLOCK (1951), in an extensive study, has checked these findings, but discovered no differences in these respects between duodenal-ulcer patients and a control series. Nor was he able to confirm the statement of DRAPER and TOURAINE (1932), that ulcer families tend to produce more males. On the contrary, he found a slight excess of females.

MARTENSEN-LARSEN (1955) has studied family factors in alcoholism. He reports that male alcoholics usually are the younger sibs, while their fathers were among the older members of their families.

The findings in the present material are given in Table 6. For comparison we have also used a peptic-ulcer series and a pertinent control series collected by WRETMARK (1953). In a comparison of this kind it is very important for the families to be of the same size, and we made sure that this was the case.

As there were no differences between the u- and uf-groups in any respects, they have been combined into one group. In this group there were a few more single children than in the other groups, but the differences were not significant.

TABLE 6.—POSITION AMONG SIBLINGS IN DIFFERENT GROUPS

Position among siblings	I				II			
	u + uf group		o-group		peptic ulcer group		controls	
	n	%	*n*	%	*n*	%	*n*	%
Single	5	10·2	4	4·9	12	7·4	9	5·3
Eldest	5	10·2	28	34·6	36	22·1	33	19·6
Middle	24	49·0	40	49·4	81	49·7	83	49·1
Youngest	15	30·6	9	11·1	34	20·8	44	26·0
Total	49		77		151		160	

o-group—u-uf-group $\chi^2 = 13{,}59$ $0{\cdot}001 < P < 0{\cdot}01$
o-group—controls $\chi^2 = 15{,}70$ $P < 0{\cdot}001$
o-group—peptic ulcer group $\chi^2 = 5{,}90$ $0{\cdot}05 < P < 0{\cdot}10$

The most striking feature is that the o-group contains a higher number of eldest children than the others (single children excluded). The differences are significant at the 1 % level except for the difference between the o-group and the peptic-ulcer group, which may well be due to chance.

As to peptic ulcer, our results are consistent with those of KELLOCK (1951); the position among siblings is the same in the peptic-ulcer series and in the healthy control series. The individuals of the u + uf-group, however, seem to be the youngest more often than those of the o-group. This may be compared with the results of RUESCH (1948). As to the alcoholics, our results are in accordance with those of MARTENSEN-LARSEN (1955) only as far as the u- + uf-group is concerned, while they disagree with his in the case of the o-group.

As judged by our results, we would be tempted to state that the results of RUESCH (1948) can only be confirmed in peptic-ulcer patients who are at the same time alcoholics, and the results of MARTENSEN-LARSEN (1955) can only be confirmed in alcoholics who also have peptic-ulcer disease themselves or in their family. For the moment, however, the situation seems to be very confused and there is need for more extensive study before it can be clarified. Of some interest is the fact that the u- and uf-groups even in this respect seem to differ from other alcoholics, which suggests that we are here dealing with a group which merits particular attention.

Frequency of peptic ulcer in families of alcoholics. We have compared the frequency of peptic ulcer in the normal population (520 individuals) with the same frequency in brothers of the alcoholic series (224 brothers). The frequency of peptic ulcer was $8{\cdot}1 \pm 1{\cdot}2$ % among the former and $10{\cdot}3 \pm 2{\cdot}0$ % among the latter. The figures are based on the statements of the probands. An inquiry into the frequency of peptic-ulcer individuals who were not alcoholics, in comparison with the same frequency among near-relatives of alcoholic ulcer individuals, showed no differences nor even tendencies.

Frequency of alcoholism in families of alcoholics, with and without peptic ulcer. The statements as to the presence of alcoholism in family members are based on information given by the patients, by their relatives, and by social workers. The frequencies

found are given in Tables 7 and 8. No alcoholism was reported in females. Female alcoholism is presumably very rare in Sweden as compared with many other countries.

TABLE 7.—FREQUENCY OF ALCOHOLISM AMONG FATHERS OF THE ALCOHOLICS

u-group (total 23)		uf-group (total 25)		o-group (total 78)		Diff. u-uf CR	Diff. u-o CR	Diff. uf-o CR
n	%	*n*	%	*n*	%			
5	21·7 ± 8·8	9	36·0 ± 9·8	16	20·5 ± 4·5	1·1	0·1	1·4

TABLE 8.—FREQUENCY OF ALCOHOLISM AMONG BROTHERS OF THE ALCOHOLICS

u-group (total 38)		uf-group (total 50)		o-group (total 136)		Diff. u-uf CR	Diff. u-o CR	Diff. uf-o CR
n	%	*n*	%	*n*	%			
15	39·5 ± 7·9	9	18·0 ± 5·4	12	8·8 ± 2·4	2·2*	3·7**	1·5

As the tables show there is no difference among the fathers, while alcoholism in brothers of the u-group is much more common than in brothers of the o-group. This difference is highly significant. The brothers of the uf-group holds an intermediate position in this respect.

If we assume that these figures are correct, the over-representation of alcoholism often reported among brothers of alcoholics is mainly due to an accumulation of alcoholism among brothers of alcoholics with peptic-ulcer disease. A tentative formulation would then be that, if there is a disposition for developing alcoholism, this should manifest itself more easily among siblings with an additional disposition for peptic ulcer.

However, we consider our findings on this point to be rather obscure, and any interpretation as to their biological or psychological significance to be premature.

DISCUSSION

The present investigation has shown that in a clientele of alcoholics attending an out-patient clinic there is a greater number of peptic-ulcer individuals than would be expected. This seems to be due to the fact that there are so many duodenal ulcers in the group. If the material is divided in three groups, viz. alcoholics who have or have had peptic ulcer themselves, those who have no ulcer but whose close relatives have this disease, and finally other alcoholics, it is found that the first two groups are very similar and that they differ significantly from other alcoholics in the following ways: namely in their referral to the clinic, the stage of their alcoholism, their motives for alcohol consumption, and the presence of certain personality traits and attitudes.

What seems noteworthy is the high duodenal : gastric ulcer ratio, implying an excess of the type of peptic ulcer, in which according to our present knowledge, psychological factors are most important.

It is also remarkable that alcoholics without peptic ulcer, but with near-relatives suffering from the disease, in nearly all respects give the same picture as the ulcer individuals. Moreover, since it has been demonstrated that the initial onset of the

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ulcer disease in most cases was before the onset of any alcohol abuse, it might be concluded that the abuse cannot be the cause of the ulcer but that peptic ulcer and alcoholism in these groups are different manifestations of a common basic disturbance.

It may be of practical value to know that patients with peptic ulcer or with near-relatives with this disease represent an important part of those alcoholics who are seen in the out-patient clinic. It may also be of value to recognize that this group differs in many respects from other alcoholics. The differences refer to the pathogenesis, nature, and course of alcoholism, which indicates the need for a specific therapeutic approach in these cases.

SUMMARY

(1) The frequency of peptic ulcer in the alcoholic series investigated was higher than that found in the normal population.

(2) The ratio duodenal : gastric ulcer was 7·0 : 1, while the expected ratio is 2·3–2·6 : 1.

(3) Individuals in the u-group came to the out-patient clinic for alcoholics on their own initiative much more often than those in the o-group. The uf-group held an intermediate position in this respect. The ulcer frequency among those who came on their own initiative was 34·4%.

(4) The individuals in the u- and uf-groups were significantly more often in the stage of alcohol addiction as compared to the o-group, whereas this group contained relatively more cases with chronic alcoholism.

(5) In most cases the initial onset of peptic ulcer was before any onset of alcohol abuse. There is no reason to believe the ulcer to be secondary to the abuse.

(6) In examining the motive for alcohol abuse, it was found that "nervousness" was the predominating factor in the u- and uf-groups, which was rarely the case in the o-group.

(7) The tendency to be worried, tense, unable to relax, and overambitious, was more frequently found in the u- and uf-groups. In these respects they differed significantly from the o-group.

(8) A comparison of the frequency of peptic ulcer in the families of alcoholics and the families of normals did not show any differences.

(9) There was a significant difference in the frequency of alcoholism among brothers of the u-group and brothers of the o-group. Brothers of alcoholics with peptic ulcer were alcoholics to a significantly higher extent. Even in this respect the uf-group hold an intermediate position.

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CLINICAL PSYCHIATRIC STUDIES USING THE SEDATION THRESHOLD*†

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THE sedation threshold is an objective index of sedation tolerance, based on e.e.g. changes produced by intravenous sodium amytal (SHAGASS, 1954). A number of significant psychological correlates of the threshold have been demonstrated (SHAGASS, 1954, 1956; SHAGASS and NAIMAN, 1955, 1956). The most important relationships may be formulated as follows. The threshold is positively correlated with degree of manifest anxiety and negatively correlated with degree of impairment of ego functioning, in the sense of contact with reality. Thus patients with severe anxiety states have the highest thresholds and patients with organic psychoses have the lowest. Another correlate is in terms of personality traits, with the threshold being low in hysterics and high in obsessionals. The sedation threshold has been used for some time as a test for psychiatric diagnosis, the most common application being to differentiate between neurotic and psychotic depression, which it does with a high degree of accuracy (SHAGASS, NAIMAN, and MIHALIK, 1956).

The present study deals with the stability or repeatability of the sedation threshold. Some data bearing on this problem were presented in a previous paper (SHAGASS and NAIMAN, 1956). The test-retest correlation coefficient for twenty patients was 0·91 and the mean thresholds for initial and repeat tests were almost identical. These results indicated that the threshold was very stable and suggested the possibility that it might reflect a relatively enduring biological characteristic. On the other hand, there was some evidence to suggest that it might change in association with changes in clinical status. This possibility was raised by the results for two cases, whose thresholds decreased significantly and who had also showed considerable clinical improvement between tests. It is obviously an easier task to disprove than to prove that the threshold is relatively fixed. Should it be disproved, by evidence that the threshold changes significantly, one may ask whether such changes are clinically meaningful, i.e. do they reflect alterations in clinical status? Such information is important if one is to apply the sedation threshold in clinical psychiatric investigation. The purpose of this study was to obtain data bearing on these questions, concerning the stability and the clinical significance of change in the sedation threshold.

METHODS

Sedation threshold procedure. The technique has previously been described in detail (SHAGASS, 1954; SHAGASS and NAIMAN, 1956). Sodium amytal is injected intravenously at the rate of 0·5 mg/kg body weight every 40 sec until after slurred speech is noted. The drug produces an increase of 15 to 30 c/sec activity in the frontal e.e.g., which is recorded continuously. The amplitude of the frontal fast activity is measured and a curve is plotted, depicting the change in amplitude with increasing amounts of amytal. Nearly all such curves contain an inflexion point, before which amplitude

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tends to rise suddenly and after which it tends to plateau; this point is usually associated with onset of slurred speech. The sedation threshold is expressed as the amount of sodium amytal, in mg/kg, required to produce the inflexion point. About two-thirds of the e.e.g. records for this study were measured by the hand method, used in earlier work. Records of the remaining cases, studied later, were measured by means of an electronic integrator (DAVIS, 1956). Results by the two methods were generally the same, but test-retest comparisons for a given case were based on determinations derived by the same method.

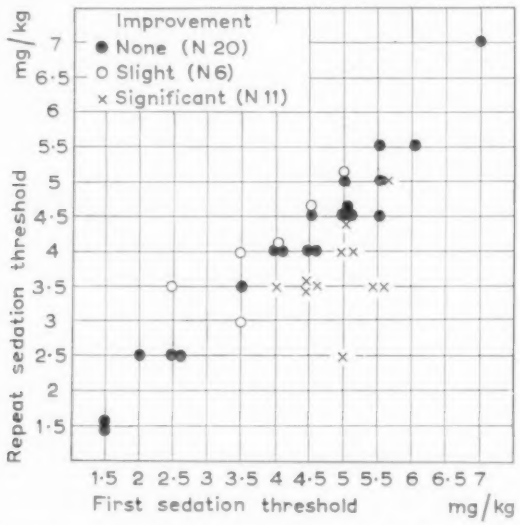

FIG. 1.—Test-retest scattergram. Points marked in relation to degree of clinical improvement.

Subjects. Data consist of eighty-nine sedation threshold tests on forty psychiatric patients. Three patients, who received a total of fifteen tests, were studied serially for special reasons, and will be presented in individual case study form. The remaining thirty-seven represented all of the patients, among the first 750 tested, who received repeat tests uncomplicated by intervening electroconvulsive therapy (e.c.t.) or drugs, such as reserpine, which might in themselves affect the threshold. The group contained eighteen men and nineteen women and ranged in age from 18 to 68, with a median age of 37 years. A wide range of psychiatric diagnoses was represented in the group. Psychoneuroses predominated (twenty-five cases, nineteen of whom were classed as anxiety state or neurotic depression); five patients were classed as "borderline" schizophrenia (SHAGASS, 1956); the remainder were diagnosed chronic schizophrenia and psychotic depression (two each), and general paresis with depression, chronic brain syndrome with depression, and character disorder (one each).

Time between tests. The intertest interval ranged from 2 to 457 days, with a median of 31 days. Nine retests were done at the beginning of a second admission, with a period of 98 to 457 days (median, 357 days) between tests. The remaining twenty-eight patients were retested during the same admission after 2 to 69 days.

Clinical evaluation. Evaluation of change in clinical status was mainly based on regular progress notes by attending and resident staff. Occasionally, for confirmatory purposes, nursing notes were used, and a few patients were personally interviewed by the investigators. As will be seen, the essential criteria were descriptive, rather than interpretative, and were derived from conventional behavioural observation and functional enquiry.

RESULTS

A. *Group data*

Test-retest correlation. The scatterplot in Fig. 1 shows the relationship between initial and repeat sedation thresholds for the entire group of thirty-seven cases.

Mean initial and repeat thresholds were 4·37 and 3·93 mg/kg respectively. The product-moment coefficient of correlation was 0·83. Taking this correlation into account in determining the standard error of the difference between means, the initial mean threshold was significantly higher than the repeat mean ($P < 0·01$). Thus, although the test-retest reliability was fairly high for the group as a whole, there was a significant decrease in threshold on retesting.

Clinical change and sedation threshold changes. It was possible to distinguish three categories of clinical change in the patients: no change, slight improvement, and significant improvement. As might be expected, there was a definite association between duration of hospitalization and degree of change. Those patients, with the exception of readmissions, who were retested after a longer interval, generally seemed to have improved to a greater extent.

(a) *No change.* Twenty patients were considered to have shown no change in clinical condition when retested. Nine were retested when readmitted, and the median intertest period for the remainder was only 9 days. Following is a brief description of one of these patients:

Case 1. Female, 36, admitted 3 Nov. 1953, tested 5 Nov. and 14 Dec. She had made a number of suicidal gestures on a neurotic basis, and had been drinking to excess as a means of relieving marked inferiority feelings of lifelong duration. Complained of insomnia, anorexia, anxiety, tearfulness, restlessness, and irritability for past 2 years. Diagnosis: chronic anxiety state with symptomatic alcholism. Treatment: psychotherapy, subcoma insulin, sedatives. About 14 Dec. it was noted that she continued to have temper tantrums on the ward, was expressing suicidal threats, and that so far she remained unstable. Sedation thresholds, both 5 mg/kg.

(b) *Slightly improved.* Six patients, retested after a median period of 23 days, were considered to be only slightly improved. The following case is an example:

Case 2. Male, 27, admitted 18 Mar. 1954, tested 18 Mar. and 9 Apr. Reported recent transient *episodes*, involving illusions and vague ideas of reference. Complained of anorexia and insomnia, was unable to concentrate, was depressed, had some suicidal ideas, was apprehensive in trams, feels that "brain is shattered," was conscious of incestuous fantasies, homosexual problems. Diagnosis: borderline schizophrenia. Treatment: psychotherapy, subcoma insulin, chlorpromazine. About 9 Apr., was noted to be reacting well in psychotherapeutic relationship with some diminution of symptoms. Sedation thresholds were 5·0 and 4·5 mg/kg respectively.

(c) *Significantly improved.* Eleven patients retested after a median of 33 days were judged to be significantly improved. It should be emphasized again that this judgment was in terms of symptoms and involved no assumptions of character change or resolution of deep-seated conflicts. The following are two illustrative cases, included in this group:

Case 3. Female, 31, admitted 7 Jan. 1954, tested 14 Jan. and 7 Feb. Complained of feeling sleepy and fatigued, waking up frightened, crying easily, palpitations, dyspnoea, tremors, hyperhidrosis, headaches, irritability, anorexia, diarrhoea, abdominal aches, urinary frequency, syphilophobia, and was perfectionistic. Symptoms present for 8 years, worse 2 years, since illegal abortion. Diagnosis: anxiety state in an obsessional personality. Treatment: psychotherapy, subcoma insulin. By 7 Feb. it was noted that she had made a remarkable response to therapy, was asymptomatic, and seemed to have acquired insight into her difficulties. Sedation thresholds were 4·5 and 3·5 mg/kg respectively.

Case 4. Male, 51, admitted 18 Aug. 1955, tested 19 Aug. and 8 Sept. Always a tense, obsessional person. For 7 months increasing anxiety and some depression, starting when he didn't receive an expected salary increase. Occasional drinking to excess. Symptoms worse after death of a friend some weeks before admission. Unable to concentrate, restless, afraid to go to work, insomnia, anorexia, crying spells, tremors. Diagnosis: chronic anxiety state with acute exacerbation.

Treatment: directive psychotherapy (reorientation toward wife and employers with their co-operation), subcoma insulin. On 6 Sept. was noted to have gained 13 lb, responded well to a visit by his resented work superior, cheerful, "feels wonderful," looking forward to return to work. Sedation thresholds were 4·5 and 3·5 mg/kg respectively.

Cases falling into the three improvement groups are plotted separately in Fig. 1. It is clear that the greatest sedation threshold changes occurred in the eleven "significantly improved" cases. Their mean initial and repeat thresholds were 4·91 and 3·73 mg/kg respectively; the decrease of 1·18 mg/kg was highly significant statistically. All eleven showed a decrease in threshold, ranging from 0·5 to 2·5 mg/kg; eight thresholds decreased by 1·0 mg/kg or more. The rank order test-retest coefficient of correlation for the "significantly improved" group was 0·54, which was not quite statistically significant. These eleven cases contributed most of the test-retest change to the data of Fig. 1. When they were removed, the product-moment coefficient for the remaining twenty-six cases became 0·96. Initial and retest means for the twenty-six "no change" and "slightly improved" cases were not significantly different, being 4·13 and 4·02 mg/kg respectively. The data then indicate that the sedation threshold was very stable as long as clinical status did not alter more than slightly.

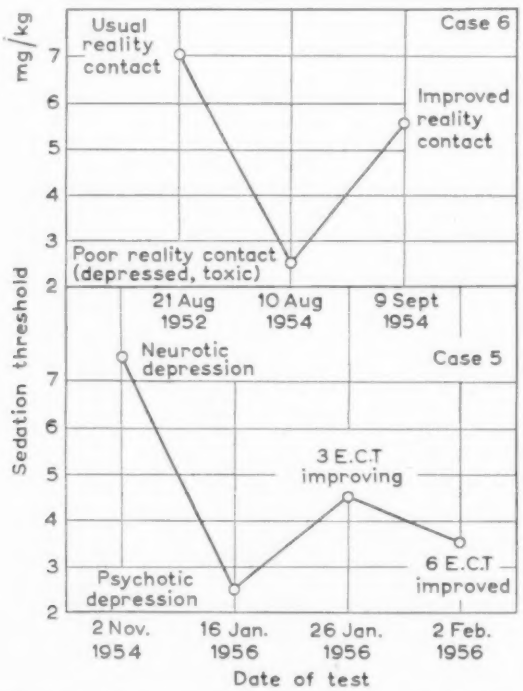

FIG. 2.—Sedation thresholds of Cases 5 and 6 in relation to clinical status. Case 5 illustrates change from neurotic to psychotic depression. Case 6 shows effect of confusional state.

When degree of emotional disturbance was significantly reduced, high thresholds decreased. The change was usually toward an intermediate value; of the eleven retest thresholds in the "significantly improved" group, eight were 3·5 or 4·0 mg/kg. These values are close to the average for patients diagnosed as mixed neurosis.

The data for the six "slightly improved" patients were more like those of the "no change" group than the "significantly improved" group. Since it may be argued that another investigator might have classified some of these patients as "significantly improved," it seemed advisable to calculate another set of statistics to compare the "no change" group with the two "change" groups. The difference between the "change" and "no change" groups in mean threshold decrease on retest was only 0·56 mg/kg, considerably less than the difference of 1·07 mg/kg between the "significantly improved" and other groups. However, this difference of 0·56 mg/kg was significant at the 2% level of confidence. Thus, even if all of the patients classed as "slightly improved" were reclassified as "significantly improved," the data would still support the conclusion that the sedation threshold decreases in association with clinical improvement.

B. *Individual case studies*

Case 5. *Neurotic and psychotic depressive episodes.* This woman was first admitted 1 Nov. 1954 at the age of 42. Depression and anxiety had begun 5 months before, with insomnia, anorexia, and loss of interest in social affairs. A previous brief depression had occurred 6 years before when she learned of her first husband's infidelity. Exploration under sodium amytal revealed that the patient was markedly hostile toward her second husband, and felt that she had made a mistake in leaving the first one and remarrying. It was thought that her present depression began when her child rather suddenly recovered from a congenital dislocation of the hip, the care of which had required a lot of the patient's time. This left her much free time. She was an energetic person, who had led a rather gay, Bohemian existence in her first marriage. At present she was trying to find her place in a Catholic social structure, which does not sanction divorce, and in which knowledge of her past might jeopardize her husband's professional position. She felt rejected by her husband and his cultural group. Psychological testing supported the clinical diagnosis of neurotic depression; relevant evidence indicated that reality contact was good. The e.e.g. of 2 Nov. 1954 was normal. Sedation threshold was 7·5 mg/kg. Treatment was conservative, consisting of sedation, subcoma insulin, and an attempt to initiate depth psychotherapy. She responded with considerable symptomatic remission and was discharged after 30 days.

Although plans had been made for continued psychotherapy, the patient did not follow them. She was reasonably well until Oct. 1955, then once again began to feel depressed and anxious. She was readmitted on 13 Jan. 1956, after a few office visits. The attending psychiatrist now felt that she was probably in a state of psychotic depression. She showed hopelessness, unshakeable ideas of worthlessness and self-blame, diurnal fluctuation of mood, loss of energy, irritability, inability to concentrate, and some psychomotor retardation. There were suicidal ruminations. Psychological testing yielded results similar to those of the first admission, but with more exaggerated pathology; they suggested the probability of psychotic depression. Sedation threshold was 2·5 mg/kg on 16 Jan. 1956. Treatment with e.c.t. at the rate of three weekly was started on 20 Jan. By 25 Jan. the patient had received three treatments and was improving. Sedation threshold was 4·5 mg/kg on 26 Jan. The last threshold, done 2 Feb., was 3·5 mg/kg. At this time the patient seemed to have made a complete remission, was cheerful, alert, energetic, and sleeping without sedation. She was discharged on 8 Feb. after receiving a total of 7 e.c.t's. Sedation threshold data are graphed in Fig. 2 (bottom).

Comment. This case presented the rare opportunity of studying the sedation threshold during neurotic and psychotic depressive episodes in the same patient. As anticipated, the threshold was high when she presented a clinical picture of neurotic depression and low during the psychotic episode. The clinical response to e.c.t., which followed the typical time course expected in psychotic depression, serves to reinforce that diagnosis on the second admission. The sedation threshold frequently increases after e.c.t. It is not yet clear to what extent this increase represents

a direct physiological effect of e.c.t. and to what extent it is governed by personality factors.

Case 6. *Toxic Psychotic Episode.* Patient was 36 years old at the time of her first admission, 23 July 1952. She dated the onset of her illness back 4 years, when she began to complain of difficulty in remembering, insomnia, felt that her neck was crooked, that she was not walking straight and that her whole body was "funny". She had sought psychiatric treatment and, during the preceding 3 years, had received a considerable amount of psychotherapy, both individual and group, much sedation, and a course of subcoma insulin. Treatment had accomplished relatively little. She became progressively less able to work and her already poor interpersonal relations with members of her family deteriorated. She displayed increasing evidence of paranoid thinking; this was most marked in the situation of group psychotherapy, where she stood out so sharply from the remaining patients, who were not psychotic, that she had to be discharged from the group. On admission she showed severe blocking, being unable to complete any sentence, marked evidence of tension and anxiety, disturbance of the body image, and probable somatic delusions, as suggested by a graphic description of the arrangement of the nerves in her right forehead. A diagnosis of chronic mixed schizophrenia was made by the attending psychiatrist. Evidence from psychological tests was in agreement. The e.e.g., taken 21 Aug. was normal. Photic stimulation produced generalized myoclonic twitching, without accompanying convulsive brain potentials. Sedation threshold was 7 mg/kg. She responded to conservative management with some diminution of anxiety and was discharged after 44 days.

After discharge she tried many jobs, but was unable to keep one for long. When readmitted, 4 Aug. 1954, she had been unemployed for over 7 months, had become seclusive, increasingly depressed, and had been taking excessive quantities of barbiturates and occasionally alcohol. She had been confused for 15 days before admission, probably due to barbiturates. On admission she was confused and disorientated, expressed ideas of persecution, and showed blocking of thought. She was given one e.c.t. on the day of admission and no further ones till 13 Aug. On 6 Aug., she was still overtly confused and incontinent of stools. She spent most of her time sitting about apathetically and gave the impression of being exhausted. Over the next days her reality contact appeared to improve and she was not overtly confused when she came for e.e.g. on 10 Aug. The e.e.g. showed a slower background alpha frequency than in 1952 and a greater irregularity of ryhthms. A generalized photomyoclonic response was again elicited. Sedation threshold was now 2·5 mg/kg. Although slurred speech and drowsiness were noted after 2·5 mg/kg, she was given 6 mg/kg of amytal, still less than her threshold two years previously. At the end of the injection the patient became disorientated as to time, even though there was no intervening period of sleep. Another sedation threshold was done on 9 Sept. The last preceding e.c.t., which was the seventh, had been given on 25 Aug., 15 days previously. The patient's clinical condition was improved, being close to her usual level of the past few years; there was no question of confusion, and she had returned to fastidious care of personal appearance. Sedation threshold was now 5·5 mg/kg. There was no disorientation after the injection. The sedation thresholds for this patient are charted in the top half of Fig. 2.

Comment. This chronic schizophrenic patient usually displayed a very intense degree of anxiety and, except for certain spheres, maintained reasonably good reality contact. The first threshold, 7·0 mg/kg, was in accord with this clinical picture. Following a period of severe depression and probable barbiturate intoxication she became disorientated. The second threshold was done when disorientation had receded somewhat, but could still be brought out by amytal; this has been shown by WEINSTEIN *et al.* (1953) to be a sign of organic brain damage. The low threshold, 2·5 mg/kg, at this time would be expected in a state of marked disorganization of ego functioning, which was probably due mainly to the factor of intoxication, but could also be associated with severe depression. The final threshold, 5·5 mg/kg, was determined when the patient's clinical state approached that seen two years previously. Any possible direct effect of e.c.t. in raising the threshold would be

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minimized by the fact that the test was done over two weeks after the last preceding treatment.

Case 7. Serial Studies in an Anxiety State. This single woman was first admitted to the medical ward in 1945 at age 46, with complaints of: constant dizziness, sensation of swelling of the head, loss of balance, nervousness, easy crying, and numbness and tingling of the hands. Complaints had been present about 10 months. Investigation revealed no demonstrable organic disease and she was discharged after 5 days. Over the next 10 years she had ten further admissions to the Royal Victoria Hospital. Six of these were to this Institute, with diagnoses of chronic anxiety state and depression on five occasions; involutional melancholia was the diagnosis on the first psychiatric admission in 1946. The remaining four admissions were to the neurological (twice), orthopaedic, and medical services. Neurological and orthopaedic investigations were generally negative, although a minor congenital anomaly of the cervical spine was discovered. The medical admission in 1954 was for stabilization of diabetes mellitus of mild degree, and was really an interlude between two periods of psychiatric hospitalization.

She was first tested on 29 May 1954. Sedation threshold was 5·0 mg/kg. Psychiatric examination at that time revealed a high degree of subjective and objective tension, feelings of weakness and uselessness, some motor retardation, occasional suicidal rumination, and the long-standing somatic complaints present on first admission. Psychological tests supported the impression of a chronically depressed and insecure individual with marked inability to express agressive-hostile impulses. There was no evidence of psychosis. Treatment at first consisted of sedation and attempts at psychotherapeutic exploration, with and without adjuvants. The treating physician made no headway with psychotherapy and, by the end of July, commenced to use e.c.t. After seven treatments there had been no appreciable benefit. Prolonged narcosis was then instituted and maintained for 24 days. There was some improvement for one week after narcosis was stopped, but this was followed by relapse. In early October a single biparietal nonconvulsive treatment (Reiter) was administered. The next day the patient seemed unusually cheerful and requested discharge. Her request was granted and she returned to her home, one hundred miles away.

She was re-admitted on 17 Mar. 1955. Her complaints had been back in their original intensity for 3 months. Findings on psychiatric and psychological examination were the same as in 1954. Since the patient had previously shown some response to a single nonconvulsive electrical treatment, it was decided to administer a full course, together with chlorpromazine medication. On this regime she showed fluctuations in the intensity of her symptoms, which would improve slightly and then relapse. On 29 Apr. reserpine, 1 mg q.i.d., was added to her medication; on 11 May, it was her only regular sedative. With reserpine there was again an initial improvement, followed by quick relapse. As the nonconvulsive treatments continued, even the fluctuations in her symptoms disappeared, and interviews consisted mainly of prolonged reiteration of somatic complaints. After a full course of twenty-five nonconvulsive treatments had been given, the last on 27 May, they were stopped.

Supervision of the public ward service responsible for the patient was assumed by one of us on 15 May. Following a verbal suggestion by Dr. A. HOFFER of Saskatchewan, we had become interested in the possibility that high doses of nicotinic acid might modify the sedation threshold. Dr. HOFFER had supplied us with special 500-mg nicotinic-acid tablets. Since all usual forms of therapy had failed, this patient seemed a suitable subject for a trial of nicotinic acid. The rationale was that, should this agent be shown to lower the threshold, the combination of nicotinic acid and moderate doses of barbiturates might serve to control her tension. Reserpine was continued at the dose of 4 mg per day, since its elimination rate would be uncertain. No barbiturates were given. Chloral hydrate 1·2 gm was given for night sedation. Sedation threshold, before nicotinic acid and with reserpine, was 7·5 mg/kg on 1 June 1955. The explanation for the increase of 2·5 mg/kg over the threshold of 29 May 1954 is uncertain; possible factors were recent electrotherapy, reserpine, and increase of anxiety.

Nicotinic acid, 1000 mg t.i.d., was started 2 June. Within the next few days the patient seemed to improve considerably; she appeared more relaxed, smiled freely, and seemed less hostile. Sedation threshold on 6 June showed a remarkable drop to 4·0 mg/kg. Another threshold on 10 June gave the same result. Reserpine was discontinued on 11 June, and replaced by phenobarbital in the form of a daily "spansule" (Eskobarb) containing 100 mg. She was allowed pentobarbital 100 mg h.s., in place of chloral hydrate. It was noted that her symptomatic improvement continued. A further

sedation threshold was 4·0 mg/kg on 17 June. After this test, the dose of nicotinic acid was reduced to one-tenth, i.e. 100 mg t.i.d. instead of 1000.

On 21 June it was noted that the patient had been able to sleep without sedation for three successive nights, that she appeared much more relaxed and complained less than at any previous time On 24 June the sedation threshold was 2·5 mg/kg. Nicotinic acid was then discontinued, and on 28 June it was noted that the patient had become more tense. A more important factor than discontinuation of medication may have been the weekend visit of her brother. He thought she looked well and suggested that it was time she returned home to resume her duties as his housekeeper. Patient was unable to see the relation between her brother's visit and the exacerbation of tension symptoms. The threshold was 4·5 mg/kg on 29 June. Nicotinic acid, 1000 mg t.i.d., was resumed from 29 June to 5 July, and reduced to 100 mg on 5 July. On 5 July it was noted that, while somewhat improved over the previous week, there had been no return to the maximal level of symptomatic relief, achieved about 24 June. This may have been connected with ongoing discussions of discharge plans between the social worker and the patient. The final sedation threshold, on 8 July, was 4·5 mg/kg. Discharge was effected on 12 July 1955. Although requested to communicate with us, the patient has not done so.

TABLE 1.—CASE 7. RELATION OF SEDATION THRESHOLD TO ASSESSMENT OF CLINICAL STATUS FROM NURSING NOTES

Date of test	S.T. (mg/kg)	Assessment*
29 May 1954	5·0	−1·0
1 June 1955	7·5	−0·7
6 June 1955	4·0	−0·2
10 June 1955	4·0	−0·5
17 June 1955	4·0	+0·3
24 June 1955	2·5	+1·0
29 June 1955	4·5	+0·2
8 July 1955	4·5	−0·1

* Mean number of favourable (+) less unfavourable (−) daily notations during period between tests.

Nurses' ward notes were examined to provide an independent criterion of changes in this patient's behaviour. Each day's entries, usually made by three different nurses, were graded as plus or minus. A plus rating included such statements as: pleasant manner, facies bright, cheerful, relaxed, happy. A minus rating included: somatic complaints, tenseness, expression of suicidal ideas, feelings of hopelessness. Any one day could be rated as: plus, minus, or both plus and minus. The total number of plus and minus signs for each intertest interval, up to and including the day of the test, were then added together and averaged. If the total minus signs exceeded the total plus signs, the sign of the mean index would be minus. The relationship between the sedation threshold and this rough index of behavioural and affective status is shown in Table 1. It is evident that there was fair agreement between the changes in the threshold and the nurse's observations. For example, the week preceding the low threshold of 2·5 mg/kg was the only one in which there were no unfavourable statements.

Comment. The data for Case 7 are summarized in Fig. 3. This shows the fluctuations in sedation threshold in relation to a rough overall appraisal of clinical status and the medications. There is no support for any specific influence of nicotinic acid, since both low and high thresholds were obtained with it. Reserpine and phenobarbital also seemed to make little difference. The main relationship is between the sedation threshold and clinical status; "good" status, in terms of diminished anxiety and depression was associated with a lower threshold, "poor" status with a higher one.

The reasons for the observed clinical changes are not certain. A visit from the patient's brother and discussion of plans for discharge from hospital have been

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mentioned as environmental factors of significance in producing increase of tension and a raised threshold. It is conjectured that the major factor leading to clinical improvement during the period of observation was the increased interest and attention directed toward the patient. The "experiment" transformed her from a hopeless patient, whose condition was resistant to all therapy, into one who might improve and who was seen frequently by the chief of service. The patient was a graduate

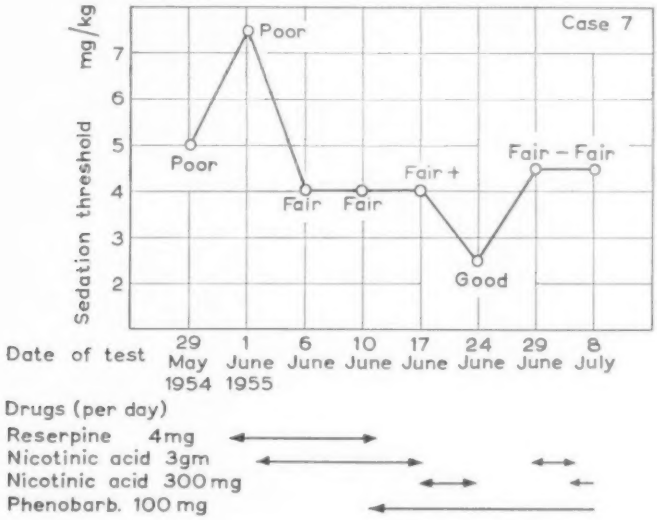

FIG. 3.—Serial sedation thresholds, Case 7, in relation to clinical assessments of psychiatric status and to medication.

nurse, which perhaps contributed to the importance of the status factor. However, when she was confronted with the need to return to her unpleasant environment, there was a partial relapse.

DISCUSSION

The results of this study support two conclusions: (a) The reliability of the sedation threshold is very high; initial and repeat test results were almost identical, provided the clinical psychiatric status of the subject did not alter significantly between tests. (b) When the sedation threshold changes, it appears to do so in meaningful relation to changes in the total clinical picture. As expected from the previously determined psychological correlates of the threshold, it decreased when manifest anxiety decreased and increased when severely impaired ego function improved. Further investigation will be required to determine how closely the threshold reflects each type of clinical change and whether the threshold changes before or after the clinical picture alters.

Present data contradict the hypothesis that the sedation threshold may be a relatively enduring biological characteristic, perhaps determined on a constitutional basis. This hypothesis was suggested by previous evidence that the threshold is very stable, which appears to have been obtained from a group of patients whose clinical status was about the same both times they were tested (SHAGASS and NAIMAN, 1956). It now seems clear that, although the threshold is indeed a very reliable

measurement, what it measures may change from time to time in the same individual. This fact is of considerable practical importance. If the threshold were relatively fixed, its application would be restricted to the area of diagnosis. It may now be proposed as an objective index of therapeutic change, of potential use for research purposes or as a guide in clinical practice.

It has been difficult to arrive at a completely satisfactory formulation of the psychological factor which is positively correlated with the sedation threshold. This factor has been identified with "tension" and "manifest anxiety" in previous papers, but it has been evident that these terms must be used with careful qualification. For example, manifest anxiety does not appear to affect the sedation threshold much in patients with hysterical personalities (SHAGASS and NAIMAN, 1956). Such findings in psychoneurotics suggested that the sedation threshold might reflect personality structure, with associated differences in anxiety proneness, rather than the affective reaction itself. This view was reinforced by concordance of results in the neuroses with those obtained by psychological studies of introversion-extraversion (EYSENCK, 1955). The present evidence, that the threshold decreases when degree of affective disturbance diminishes, clearly indicates that it is more closely related to affect than to personality factors.

In order to formulate the "anxiety" correlate of the sedation threshold, the following facts must be suitably integrated: (a) The threshold reflects changes in degree of affective disturbance, but apparently not in everyone. (b) The threshold is correlated with relative predominance of hysterical or obsessional personality characteristics. Integration of the available evidence seems possible, if the following assumptions are made: (a) That there are several neurophysiological mechanisms which may mediate reactions clinically grouped together as "anxiety"; of these, the sedation threshold reflects only one. (b) That personality structure plays an important role in determining which of these several mechanisms will mediate the anxiety reaction of a particular individual. Granted these assumptions, it may be stated that the sedation threshold measures the degree of activity in that mechanism of anxiety which predominates in obsessional or introverted individuals. This formulation would explain the relatively low thresholds of hysterics with apparently severe anxiety. It would also explain the high thresholds in disturbed obsessionals, which decrease when their anxiety diminishes. It may be noted that the results showing that hysterics and obsessionals differ as to sedation threshold were based on tests carried out soon after admission to hospital. It is probable that, if the thresholds of hysterics and obsessionals were determined when the patients were in symptomatic remission, the difference between the groups would be considerably less.

The assumption that, neurophysiologically, there is more than one kind of anxiety, suggests that it should be possible to discover other indicators for those kinds not reflected in the sedation threshold. It has recently been shown that the sedation threshold is inversely proportional to the rate of depressant action of sodium amytal, and may thus be thought to measure a particular time characteristic of central neuronal excitability (SHAGASS, 1956a). This finding provides some lead for speculation about the possible neurophysiological differences between various kinds of anxiety. These differences could conceivably arise because different parameters of neuronal excitability are involved. Should this be so, our understanding of "the anxieties"

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will be advanced by development and exploitation of methods for measuring such parameters in the human subject.

SUMMARY

1. The purpose of this study was to obtain further data bearing on the test-retest reliability of the sedation threshold and to determine whether or not changes in the threshold on retest were associated in a meaningful way with clinical changes.

2. Data consisted of eighty-nine sedation thresholds from forty psychiatric patients, of whom thirty-seven were retested only once.

3. Retest results were almost identical with those of initial tests, in patients whose clinical status was relatively unaltered. Where significant clinical improvement occurred, abnormally high thresholds definitely decreased. Three case studies were presented to demonstrate that the threshold changed in the expected direction when degree of anxiety or degree of ego function impairment was altered.

4. It was concluded that the sedation threshold has high reliability and that its changes reflect significant clinical psychiatric changes. This makes it of potential value as an objective index of therapeutic effectiveness. The results also indicate that the threshold is not fixed and that it reflects affective disturbance rather than enduring personality factors.

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THE INFLUENCE OF STRESS ON MAMMARY CANCER IN MICE*

MARVIN REZNIKOFF and DAVID E. MARTIN

A NUMBER of independent investigations have suggested a possible relationship between longstanding disruptive or stressful situations and cancer in humans. (BAKER *et al.*,1952; BLUMBERG *et al.*, 1954; REZNIKOFF, 1955; STEPHENSON and GRACE, 1954) Recognizing the dangers inherent in extrapolating human data to animals, it was nevertheless felt that it would be of considerable value to examine the relation of stress to cancer in laboratory animals, under carefully controlled experimental conditions. ANDERVONT (1944) has already shown that an environmental condition such as isolated rearing, affects the age of onset of "spontaneous" mammary cancer in mice. The present research specifically endeavoured to determine the influence of a prolonged stress situation on the incidence of mammary tumours in mice and on the age of the animals when the tumours appear. An effort was also made to ascertain whether the very high percentage of infant sibling deaths, reported by the cancer patients, in one of the studies (REZNIKOFF, 1955), is indicative of a constitutional or inherited weakness, conceivably interacting with environmental tensions in the genesis of cancer process. In addition, the general effects of the stress on weight, behaviour, and bodily organs were studied. In that hormone imbalances are often linked with mammary tumours, it was conjectured that a tension or stress state might play a role in cancer by disrupting endocrine function.

PROCEDURE

Mice

One hundred animals, fifty CC_1 mice and an equal number of CC_2's, were used in this study. These hybrids were obtained from the mouse colony maintained by the Yale University Department of Anatomy, which has done extensive experimentation with these animals. The CC_1 mouse is a cross between a CBA male and a C_{57} female, while CC_2 animals are the progeny of mating CBA females with C_{57} males (Fig. 1). Therefore, the two hybrids are genetically the same and entirely indistinguishable in basic characteristics. The CBA females, however, carry the milk factor (or the

CBA male $\times$ C_{57} female $\rightarrow$ CC_1 (no spontaneous mammary tumours)
CBA female $\times$ C_{57} male $\rightarrow$ CC_2 (high-incidence spontaneous mammary tumours)

FIG. 1.—Matings of mice used in experiment.

mammary tumour inciter), which is transmitted to their CC_2 offspring in nursing and results in the CC_2 mice developing a very high incidence of spontaneous mammary tumours. On the other hand, the milk factor is absent in the C_{57} females and consequently the CC_1 mice do not develop spontaneous mammary tumours, unless they are force-bred (GARDNER,

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1941). By selecting these particular mice for this experiment, it was possible to work with two perfectly matched groups; however, with animals in one of the groups having what could be termed a "predisposition" to cancer. An additional reason motivating the choice of the CC mice is the proven vigour of these animals and their ability to withstand difficult experimental procedures.

Apparatus

Each of the mice was individually housed in a specially designed plexiglass cage approximately 5 in. × 5 in. × 5 in. in size. The floors of these cages were formed of a series of protruding 6-in. steel rods, set ½ in. apart. The general construction of the cages, and the placement of the food boxes and water bottles entirely outside of the enclosures, made it impossible for the mice to escape bodily contact with the cage floors. High-voltage capacitors were affixed to the cages and wired to the steel rods in fifty of the one hundred units. These capacitors were then connected in parallel with a series of resistors, transformers, and finally with a spark coil. The spark coil in turn was hooked to an improvised twelve-hour-clock mechanism which closed the circuit and triggered off the apparatus three times an hour at irregular intervals. With the circuit completed, the steel rods of the wired cages were converted into an electric grid which administered about four very brief shocks to the animals before the circuit was again broken. The electric shocks constituted the stress situation.

Stress technique

Mice were placed in the experiment after they reached four months of age and had one litter. Eventually, there were twenty-five animals in each of four groups: CC_1 stressed mice, CC_1 nonstressed mice, CC_2 stressed mice, and CC_2 nonstressed mice. A random method of selecting the animals to be stressed was used, and in almost every case, mice in the stress groups had litter mates in the control groups.

Once in the experiment, the mice were shocked intermittently twenty-four hours a day, seven days a week, without interruption. The control animals occupied identical cages and lived under conditions comparable to the stressed animals in every respect with the exception of not being shocked. When, during the course of the experiment, an animal developed a mammary tumour, it was immediately removed from its cage, then sacrificed and autopsied. The research was terminated when all of the mice who still did not evince mammary cancer were at least 350 days old (in most cases over 400 days old), an age beyond normal expectation for the appearance of spontaneous mammary tumours. At this time, these surviving animals were also sacrificed and autopsied. The mice were always weighed immediately after they were sacrificed. When a tumour was present, a weight determination was obtained after the tumour had been removed.

Treatment of data

Chi-square and *t* tests were employed to determine whether statistically significant differences existed between the groups with regard to number of mammary tumours and the ages of the animals in which these tumours appeared. Weight differences were also tested for significance. The findings of the autopsies done on these animals are presently being organized and evaluated, and histological examinations of certain of the tissues are being completed. This data will be reported in a subsequent paper.

RESULTS AND DISCUSSION

Weights of the mice

It is evident from Table 1 that both the CC_1 and CC_2 shocked mice weighed significantly less than their controls. In a gross manner, these weight disparities reflect the fact that exposure to electric shock represented a genuine stress situation for the mice. It is to be noted that the differences in weight between the stressed and nonstressed animals are not due to age discrepancies between the groups. When the weights are adjusted for the effects of age by an analysis of covariance design, the differences are maintained. It would be important to control these weight differences in a future research, so that their relationship to the mammary tumours could be specifically evaluated.

Behaviourally the stressed mice were in a continual state of agitation during the first stages of the experiment, later responded somewhat lethargically, and in the final period of the experiment began chewing off their tails.

TABLE 1.—COMPARISON OF MOUSE WEIGHTS IN GRAMS

Group	Mean total weight	*t*	*P*
CC_1 shocked	24·67	2·93	0·01
CC_1 not shocked	29·12		
CC_2 shocked	29·49	3·26	0·01
CC_2 not shocked	33·44		

Incidence of tumours

As can be seen from Table 2, no tumours appeared in either the stressed or non-stressed CC_1 mice. In the CC_2 group, 19 of the shocked animals and 20 of their controls developed tumours. These results indicate that the stress situation was totally ineffectual in precipitating cancer in the genetically susceptible animals when the milk factor was absent. When both the genetic and milk factor predisposing influences were present, stress did not alter the frequency with which spontaneous mammary tumours occurred.

TABLE 2.—NUMBER OF MAMMARY TUMOURS IN THE FOUR GROUPS OF ANIMALS

Group	Tumours	No tumours	Total
CC_1 shocked	0	25	25
CC_1 not shocked	0	25	25
CC_2 shocked	19	6	25
CC_2 not shocked	20	5	25

It might be emphasized at this point that the animals used in this experiment represent comparative extremes on a continuum, with one group being highly susceptible to mammary cancer and the other extremely resistant to it. Perhaps it would also be useful to investigate the influence of environmental tension on the incidence of mammary tumours in mice who were moderately predisposed to cancer of this type. A group, in which, ordinarily, 20 to 30% of the animals spontaneously develop mammary cancer, might be suitable for this purpose.

Ages at which tumours appear

On the average, tumours appeared 37 days earlier in the CC_2 stressed mice than they did in the CC_2 nonstressed animals. The mean ages of onset of the tumours were 284 days and 321 days for the CC_2 stressed and nonstressed groups respectively. This difference is not statistically significant.

Of the 19 CC_2 stressed mice who developed mammary tumours, there were 12 animals which had litter mates in the control group of CC_2's with tumours. Table 3 shows a comparison of the mice, matched by litters, for age at occurrence of tumours. The mean difference in age increases from 37 to 41 days as a result of pairing, but is still not clearly significant.

TABLE 3.—A COMPARISON OF TWELVE PAIRS OF LITTER MATES FOR AGE AT APPEARANCE OF MAMMARY TUMOURS IN DAYS

Litter	CC_2 shocked	CC_2 not shocked	Difference
1	405	308	97
2	212	316	−104
3	322	492	−170
4	434	434	0
5	401	338	63
6	159	307	−148
7	279	334	−55
8	332	485	−153
9	157	182	−25
10	203	188	15
11	197	206	−9
12	203	200	−3
	mean age 275·33	315·83	$t = 1{\cdot}63$

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An actual distribution of the ages of the 39 animals at the time the tumours occurred is presented in Table 4. In 11 of the 19 stressed mice who eventually developed tumours, the tumour appeared earlier than 300 days. By contrast, only 7 of 20 CC_2 nonstressed animals developed tumours at a comparable age.

TABLE 4.—DISTRIBUTION OF THE AGES OF CC_2 MICE AT THE TIME OF APPEARANCE OF MAMMARY TUMOURS

Age	CC_2 shocked	CC_2 not shocked
100–199 days	4	2
200–299 days	7	5
300–399 days	4	8
400–499 days	4	5
	Total 19	20

Only a very tentative interpretation of these results is possible, in that they may be due entirely to chance factors. If the differences are substantiated, by replications of this experiment, they might be explainable in terms of the studies of BLUMBERG, WEST, and ELLIS (1954) on rapidly- and slowly-growing tumours. Referring to their findings, they state, "The data obtained suggest that longstanding, intense emotional stress may exert a profoundly stimulating effect on the growth rate of an established cancer in man" (p. 285). Although they restrict their statement to "established" tumours and to human beings, it may be equally applicable to very early, essentially undetectable

cancers, not only in human beings but in lower animals as well. Thus, in the present research, mammary cancers appeared earlier in CC_2 shocked mice, possibly because stress accelerated the growth of these tumours even in their incipient stages.

SUMMARY

This research endeavoured to determine the influence of a stress situation on the incidence of mammary tumours in mice and also on the age of the animals at the time the tumour occurs. Two groups of genetically identical mice were studied. Animals in one group, however, carried the milk factor, while it was absent in the second group. One-half of the animals in each of the two groups were stressed by administering daily intermittent electric shocks to them for periods ranging from about six months to well over a year. The remaining miced served as controls.

It was found that the mice without the predisposition to mammary cancer (milk factor) did not, in any instance, develop tumours even when exposed to intensive stress. More than three-quarters of the stressed animals with a susceptibility and a comparable number of their nonstressed controls developed mammary cancers. The tumours, however, tended to appear somewhat earlier in the stressed group of mice. These findings are discussed, but it is cautioned that they are preliminary and require confirmation.

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THE MENSTRUAL CYCLE AND ITS DISORDERS IN PSYCHIATRIC PATIENTS—I*

REVIEW OF THE LITERATURE

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INTRODUCTION

THIS review is devoted to a consideration of the relationships which are believed to exist between both normal menstruation and menstrual disturbance, and the mental state. The literature is so wide-ranging that some selection must inevitably be made; this is not a complete review of the subject. In particular, the problem of menorrhagia has not received adequate consideration, owing to the nature of the original work to which this review is the preamble.

I. THE MENSTRUAL CYCLE IN NORMALS

(a) *Variations of the normal cycle*

For many years the menstrual periodicity of women was considered to be a phenomenon closely associated with the phases of the moon. Many primitive superstitions and rituals are associated with this and other beliefs in connection with the menstrual cycle. Even in present times these ideas persist, and as recently as 1934 it was observed in a standard textbook of obstetrics: "71% of women menstruate every 28 days and the majority during the full moon" (DELEE, 1934). It is still more often the rule than the exception to see in medical case notes such phrases as "Menstruation—regular 28-day cycle." However, it has become apparent during recent years that this lunar periodicity is not so constant a phenomenon as was formerly believed. GUNN, JENKIN, and GUNN (1937) investigated the relationship of the menstrual cycle to the various phases of the moon, and found that there was no correlation between the two phenomena. However, it would be correct to say that twenty-eight days is a common length of cycle which occurs with more frequency than many other cycle-lengths.

AREY (1939) summarized the results of ten series of investigations into the mean length and variability of the cycle in normal women, performed between 1889 and 1934. These involved in all an analysis of 20,000 separate cycles in over 1500 individuals. The latter were chiefly students, nurses and housewives. He subjected his findings to a statistical analysis. The division of his results into different groups was necessitated by the different methods used by various observers in the collection of their data. It did not imply that there was any known difference in the groups which he had artificially created in this manner. His findings were as follows:

1. A frequency distribution curve of 8462 cycles in 585 women and girls showed 28 days to be the most frequent length of cycle in adults, but in pubertal girls cycles of 26, 27, 28, and 29 days all occurred with equal frequency. The majority of adult cycles were between 25 and 31 days, and the extremes lay between 11 and 100 days.

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2. The mean length of cycle and standard deviation from the mean were obtained in two different ways:—

(a) By treating entire groups as a single individual and taking the mean and standard deviation of the total number of cycles.

(b) By taking the mean and standard deviation from the mean in each individual and then averaging them.

The results for groups treated as a single individual are shown in Table 1.

TABLE 1.—MEAN AND S.D. FROM THE MEAN IN NORMALS

	Cycles	Mean	S.D.	Coefficient of variation
544 adults	5672	28·4	4·92	17·03
100 pubertal girls	3140	33·9	11·8	34·83

Where each individual was treated separately, the results are shown in Table 1(a).

TABLE 1(a).

	Cycles	Commonest cycle length	Mean	S.D.	Coefficient of variation
873 adults	10,360	27	29·3	3·24	10·93
100 pubertal girls	3,140	29	33·6	14·28	42·50

3. The relationship between variability of cycle and age and recency of menarche were studied. He found increased variability during the first forty cycles following the menarche, but with increasing age variability became much less marked. The results obtained are shown in Table 2.

TABLE 2.—S.D. FROM THE MEAN RELATED TO AGE IN NORMALS

	Age	Standard Deviation
26 girls (1st–22nd cycle after menarche)	14·5	20
18 girls (25th–39th cycle after menarche)	15·5	10·36
35 girls	18–19	4·35
255 women	22–49	2·27
336 women	23–51	4·57

He found nothing to support the belief that there are other commonly occurring lengths of cycle besides 28 days. He found the frequency distribution curve to show a regular rise from 0 to 28 days, and a similarly regular descent to 69 days. He stressed that this smoothness of the curve must not be taken to indicate a tendency to regularity in the cycle, but that the large number of cycles involved served to conceal the frequent individual irregularity.

(b) *Emotional changes throughout the menstrual cycle*

It has long been believed that women vary in their mood and outlook at different times during the menstrual cycle. Many authors have noted the incidence of depression in the premenstrual phase. The frequency of suicide or suicidal attempts occurring

at the time of the menses has been studied by several observers. HELLER (1900) found 36% of 70 suicides to have occurred at times of the menses, while OLLENDORF (1905) found an incidence of 22% in 79 cases, and SLAVIK (1910) 33% of 474 cases.

The first attempt to relate different phases of the menstrual cycle with the patient's psychiatric state was made by BENEDEK and RUBENSTEIN (1939). They attempted a correlation between ovarian activity and the psychodynamic processes in neurotic patients. They took vaginal smears at different phases of the menstrual cycle and at the same time studied the material obtained in dreams. They concluded that the psychic material obtained during the first phase of the cycle up to ovulation was predominantly heterosexual in content. This tended to activate the neurotic conflict and intensified symptoms. Ovulation was followed by a release of psychic tension. After this the material obtained was described as both receptive and passive in nature.

ALTMANN, KNOWLES, and BULL (1941) studied the menstrual cycle in ten "mature college women" aged 22–36 years. They observed 55 cycles in all. The length varied between 23 and 61 days. Average length was 29·6 days. Ovulation (estimated by rectal temperatures) averaged 11·8 days. The variation in ovulation time was 5 to 23 days. They found in these women two main relationships:—

(a) "An outburst of physical and mental activity before the onset of menstruation coupled with high tension, irritability, and preceded or accompanied by depression."

(b) A second wave of activity dominated the ovulatory period. This, however, was free from any form of nervous tension.

HELENE DEUTSCH (1947a) stressed the importance of the interpersonal relationship between a mother and her daughter. The former may determine a woman's attitude towards her menses. Those who have not been adequately prepared may react with hostility and aggression. There may also be a tendency to take over the mother's own resentment and rejection of the feminine role.

ISIDOR SILBERMANN (1950) stated that it was not only in neurotics and psychotics, but in all women, that a psychological reaction to the menses occurred. He considered that there was a cyclical regression to earlier psychosexual levels, and that this was greatest in those with pregenital fixation, but that it was present to a certain extent in nearly all women. This regression was caused by the revival of oedipal and preoedipal conflicts with consequent anxiety formation.

Conclusions. It would appear that there are definite changes in a woman's general attitude and in her emotional life at different phases of the menstrual cycle. These may initially be determined by her upbringing and early relationships, particularly with the mother. Anxiety centred round early psychosexual conflicts, and in particular the problem of assumption of the feminine role, may determine subsequent attitudes towards menstruation and result in regression at a particular phase of the cycle, or in the recurrence of various types of menstrual dysfunction. During the preovulatory phase of the cycle she tends to be more heterosexual in her outlook. This may intensify any neurotic conflict if one is present, but may culminate in a wave of activity at the time of ovulation, which in normal women is entirely free from nervous tension. Following this wave of activity and in the post-ovulatory phase, women become more passive and receptive, but during the premenstrual phase another wave of physical and mental activity occurs, coupled with nervous tension.

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(c) *Incidence of menstrual abnormality in nonpsychiatric patients*

There are few published figures of the incidence of menstrual abnormality in groups of nonpsychiatric patients. STRACHAN & SKOTTOWE (1933), found the incidence of amenorrhoea to be 1·9% of 1000 patients attending a gynaecological clinic. Dysmenorrhoea occurred in 10%, oligomenorrhoea in 1·3%, and menorrhagia in 1·3%.

BISHOP and ORTI (1952) summarized a number of recent studies of menstruation in normals. These were chiefly concerned with the question of dysmenorrhoea. The incidences recorded varied between 1% and 34%. The authors themselves, in a series carried out in 1945, had found an incidence of dysmenorrhoea in 25·6% of those with irregular cycles, compared with 15% in those with regular cycles. In this series they also found a 16·8% incidence of menstrual irregularity. In the present series they analysed the histories of 1300 women. They found incapacitating pain in 330 (25·5%) women, excessive bleeding in 40 (3·07%), amenorrhoea of over one year's duration in 35 (2·6%) irregular or scanty periods in 51 (3·9%), premenstrual symptoms in 10 (0·76%). They noted the suggestion that dysmenorrhoea only occurred in ovulatory cycles (STURGIS and ALBRIGHT, 1940), and studied 148 cycles with basal temperature recordings to show ovulation. 87% of these showed the expected result, i.e. either ovulatory and painful, or the converse.

REES (1953) found the incidence of premenstrual tension in a group of 61 normals to be 21·4%. This consisted of moderate tension in 16·4% of cases, and severe tension in 5% of cases.

The incidence of the various types of menstrual disturbance is summarized in Table 3 below:

TABLE 3

	Total number in group	Type of disturbance	Incidence of abnormality
STRACHAN and SKOTTOWE	1000	Menorrhagia (over 7 days' loss)	13 (1·3%)
		Oligomenorrhoea (less than 2 days' loss)	13 (1·3%)
		Amenorrhoea	19 (1·9%)
		Dysmenorrhoea	100 (10%)
BISHOP and ORTI	1300	Menorrhagia	40 (3·07%)
		Oligomenorrhoea	51 (3·9%)
		Amenorrhoea (more than 1 year's duration)	35 (2·6%)
		Dysmenorrhoea (incapacitating pain)	330 (25·5%)
		(irregular cycles)	(25·6%)
		(regular cycles)	(15%)
		Premenstrual tension	10 (0·76%)
REES	61	Premenstrual tension	13 (21·4%)
		(moderate)	10 (16·4%)
		(severe)	3 (5%)

2. SYNDROMES OF MENSTRUAL DISTURBANCE—RELATIONSHIP TO NEUROSIS

A consideration of the main syndromes of menstrual disturbance is inseparable from that of the question of the relationship between menstrual disturbance and neurosis. What is known of the underlying physiology is described in the present section. A description of the psychopathology involves the consideration of mental mechanisms which are normally associated with neurosis. The occurrence of menstrual disturbances in neurotics has been noted by many authors. MENNINGER (1939) introduced the concept of a single dominant psychopathological entity underlying all menstrual disorders. He postulated that the body build, life history, and neurotic behaviour of certain women all stemmed from an early rejection of the feminine role. The logical expression of rejection of the feminine role was amenorrhoea. Dysmenorrhoea was the most common form of abnormality. He questioned whether the majority of psychoneurotic invalids had not had some previous form of gynaecological treatment or surgery.

KROGER and FREED (1951) described the psychoanalytic views of menstrual dysfunction. During the phallic period of psychosexual development the little girl develops strong desires to be a boy and shows jealousy of all males. This phenomenon, normally repressed, may remain fixated, and a denial of femininity results. Menstruation reactivates these early conflicts, and anxiety centred round them may result in a physiological dysfunction, i.e. amenorrhoea. The choice of the uterus is believed to be unconsciously determined and to result from repressed infantile wish-fantasies associated with infantile concepts of bodily function.

Menstrual disturbance will be discussed under three main headings as follows:

(a) Amenorrhoea.
(b) Dysmenorrhoea.
(c) Premenstrual tension.

(a) *Amenorrhoea*

Psychopathology. KROGER and FREED (1951) cited certain common precipitating causes, such as death of a loved one, especially the father; shock or accident; emotional tension provoked by argument; change of environment or an intense desire for pregnancy. DUNBAR (1938) referred to cases of psychogenic amenorrhoea characterized by a deepseated but conscious refusal to assume the feminine role. KROGER and FREED described several cases of this type and cited instances of neuroses associated with amenorrhoea in which, following a successful resolution of conflict by hypnoanalysis and hypnotherapy, normal menstruation was resumed.

Physiology. The underlying physiology in cases of amenorrhoea of psychiatric origin is still only partially understood. It is generally accepted that a disturbance of hypothalamic function must take place as a sequel to the abnormal mental state, but there is still doubt as to the route by which this disturbance is relayed to the endometrium.

SOSKIN *et al.* (1940) demonstrated that it was possible, by administering prostigmine, to precipitate the menstrual flow within 28 hours in every one of a series of twenty-five women known to have delayed menses but who had no demonstrable evidence of pregnancy. They postulated that this effect indicated an abnormally decreased vascular responsiveness of the endometrium, itself the result of a disturbance

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of autonomic function. SHER (1946) similarly precipitated the menses in seven out of nine women who had developed amenorrhoea shortly after joining the Forces. He used carbamino-choline and assumed from his results that the amenorrhoea had been caused by a hypothalamic disturbance leading to either absence of luteinizing hormone or to absence of acetylcholine in the uterus. SYDENHAM (1946) stressed the importance of dietary deficiency in the causation of amenorrhoea and described a number of cases occurring in women undergoing internment with very low food intake.

REIFENSTEIN (1946) described the syndrome of hypothalamic amenorrhoea. He regarded this as a definite entity occurring in nervous disorders and attributable to a block of the stream of impulses passing from the hypothalamus to the anterior pituitary and resulting in the discharge of luteinizing hormone. It is now known, of course, that the method of transmission is humoral (HARRIS, 1951). The syndrome was distinguishable from both ovarian and pituitary deficiency because of the presence of normal FSH levels in the urine. DECOURT and MICHARD (1953), discussing the mechanism of menstrual disturbance, observed that such irregularities as sudden cessation of the menses in midflow following an emotional shock could scarcely be attributed to an endocrine disturbance and would appear to be the result of an autonomic effect mediated via the endometrial vascular supply. In some cases of amenorrhoea there was evidence of an associated autonomic disturbance, and they postulated that adrenaline might be secreted and, by causing vasoconstriction, arrest the menstrual flow. Discussing REIFENSTEIN's syndrome of hypothalamic amenorrhoea, they noted that in some cases of prolonged amenorrhoea of apparently psychogenic origin which they had investigated, the criteria demanded by REIFENSTEIN were not all fulfilled. The reaction to oestrogen withdrawal was not always a normal one, nor were there constant results following the use of chorionic gonadotrophin. They postulated a possible local uterine abnormality produced by autonomic stimulation and derangement. They found raised corticosteroid levels in some of these patients, and postulated that there was adrenal cortical hyperactivity, presumably caused by increased secretion of ACTH. They referred to the occurrence of amenorrhoea in cases of CUSHING'S syndrome, and inferred that adrenal cortical activity played a part in the causation of menstrual disturbance.

Clinical syndromes. Amenorrhoea is a prominent feature of two well-defined psychiatric syndromes.

Anorexia nervosa. The syndrome of a complete lack of appetite accompanied by a morbid mental state was first described by Sir WILLIAM GULL (1874). Recent interest has tended to centre round the similarity between this condition and the syndrome of anterior hypopituitarism. The main point of differentiation is felt to be the assay of urinary 17-ketosteroids. MAGENDANTZ and PRAGER (1940) believed the typical features of anorexia nervosa to be conditioned by a physiological response to weight reduction and semistarvation, and not to be dependent on any actual pituitary deficiency. D. W. KAY (1953) followed up 38 cases of anorexia nervosa over a period of 5 years. He demonstrated that in at least 50% of his patients the anorexia and weight-loss could not be inferred as being secondary to pituitary deficiency. He found the syndrome to occur in several different psychiatric settings. The menses remained irregular in 45% of his patients, after 5 years of follow-up. The relationship of persistent amenorrhoea to weight-loss was very variable. In general, he postulated that the triad of amenorrhoea, anorexia, and loss of weight was a syndrome associated with a poor prognosis.

In conclusion, it would appear that the psychopathological setting of each case is most important but that the clinical picture may be extremely varied. Initially, low food-intake determines the loss

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of weight and wasting which is so characteristic of the syndrome; amenorrhoea may occur early or late. In some cases it is evident that psychic disturbance is responsible for the symptom, which is unrelated to weight-loss. In other cases, where the loss of weight occurs at an early stage, it is possible that pituitary deficiency may be a subsequent event, related at least in part to malnutrition.

Pseudocyesis. This is a syndrome of "spurious pregnancy" occurring most frequently in women who have already borne children. There is often a strong conscious desire for pregnancy, and sometimes a history of previous inability to conceive. All the classical signs of pregnancy occur, i.e. nausea, vomiting, enlarged breasts and abdominal swelling, and amenorrhoea. It is a syndrome which has been demonstrated to occur in more than one psychiatric setting. DEUTSCH (1947) described a number of patients in whom neurotic depressive reactions were the most marked feature. MOULTON (1942) described a case in which the analysis revealed typical hysterical mechanisms. The physiological concomitants of this syndrome are variable, both high and low titres of urinary gonadotrophins have been reported. Oestrogen levels in the urine are usually high. Endometrial biopsy shows a secretory type of endometrium. The syndrome is sometimes associated with the presence of a persistent corpus luteum cyst. MOULTON (1942) regarded the clinical findings as being the result of a suppression of ovarian activity by the pituitary.

RAKOFF and FRIED (1949, 1951), however, regarded pseudocyesis as being the result of persistent corpus luteum function maintained by the secretion of luteotrophic hormone. This endocrine abnormality appeared to be occurring secondarily to a profound psychic disturbance. This explanation is more consistent with the clinical findings. It is evident that, as yet, a full understanding of the physiology has not been reached.

Conclusions. The aetiology of amenorrhoea in psychiatric conditions is still not clearly understood. As with other types of menstrual disturbances, psychosexual conflict and a refusal to assume the feminine role are found in many cases. There may be excessive dependence on the mother, if the symptom is associated with an anorexia nervosa syndrome, and in these cases, as in cases of pseudocyesis, fear of and desire for pregnancy may be revealed. It would appear that the disturbance occurs initially in the hypothalamus, and a clearcut syndrome of hypothalamic amenorrhoea has been formulated. This is a disturbance which results in the suppression of luteinizing hormone and in subsequent ovarian deficiency. There may be other pathways concerned in the causation of menstrual disturbance, but there is no very clear evidence concerning these. The sudden nature of some abnormalities would infer a direct nervous, rather than a hormonal, effect. The results of precipitation of delayed menses by means of prostigmine in cases of amenorrhoea has been adduced as evidence of an autonomic effect resulting in an abnormally decreased vascular responsiveness of the endometrium. In all probability the factors concerned are multiple. The original disturbance is hypothalamic, but the effects may be mediated via the pituitary, ovaries, autonomic nervous system, and adrenal cortex.

(b) *Dysmenorrhoea*

The underlying factors are probably multiple, and range from local pelvic disease to the personality and upbringing of the woman concerned. Whether it is to be regarded as a normal or abnormal phenomenon is itself in doubt, for we have to reconcile the known incidence of 25% of cases of incapacitating pain occurring in women attending outpatient clinics, with such views as that of HAMBLEDON (1945) who stated "few, if any, healthy sexually adequate and psychosomatically sufficient women have dysmenorrhoea." It may be argued that women attending gynaecological and endocrine clinics cannot be regarded as normal, but even in an earlier series BISHOP and ORTI (1945) had found 16·5% of nurses to have incapacitating pain. STURGIS and ALBRIGHT (1940) demonstrated that the administration of oestrin

early in each cycle abolished the symptoms of dysmenorrhoea in the majority of patients. They assumed that this success was achieved by inhibition of ovulation. WITTKOWER and WILSON (1940), in a study of 57 cases of primary dysmenorrhoea, found emotional maladjustment in childhood to be four times as common as in a control group. They found a marked incidence of resentment of the feminine role in these patients, and also frequently immature physical development allied to shyness, withdrawal, and anxiety. HAMAN (1944) demonstrated that the pain threshold of dysmenorrhoeic women was lower than usual. HUNTER (1947) suggested a process of conditioning whereby monthly repetition of a painful stimulus led to the production of pain patterns in the cerebral cortex.

TAYLOR (1949) believed dysmenorrhoea to be one of the sequels of a syndrome of congestion and fibrosis in the pelvis. He believed this to be a psychosomatic entity mediated via the autonomic nervous system and resulting in persistent hyperaemia and vascular congestion leading to fibrous tissue proliferation. He found a high proportion of women suffering from this syndrome to show evidence of coexistent neurosis. KROGER and FREED (1951) discussed the question of endocrine imbalance. They noted that it is now an accepted fact that dysmenorrhoea is normally associated with ovulatory cycles, and argued that since the presence of the latter is a sign of there being a normal, rather than a disturbed, ovarian hormonal imbalance, it must be inferred that dysmenorrhoea would indicate that ovarian function was normal rather than disturbed. BISHOP and ORTI (1952) discussed the efficacy of various types of treatment. D. and C. was seldom permanently effective, the result of treatment with gonadotrophins and sex hormones had been very variable, and presacral neurectomy was not embarked upon without considerable thought. They suggested that the only rational approach to the treatment of dysmenorrhoea was to cause inhibition of ovulation by giving 2–3 mg of stillboestrol daily for 14 days within 5 days of the previous menses. They used this form of treatment in 27 patients, observing 533 cycles in all. In the majority of these cases relief of pain was achieved.

ALEXANDER (1952) regarded dysmenorrhoea as having both physical and emotional aspects. The emotional factor was sometimes expressed in the form of a premenstrual tension state, and sometimes as a depression with hypochondriacal anxiety. He regarded anal eliminative and retentive tendencies as being responsible for the emotional accompaniments of dysmenorrhoea, and presumed that these were associated with an autonomic discharge which resulted in such symptoms as menstrual colic. The general nervous excitation was possibly due to a recurrence of the anxiety first experienced at the menarche, and to this was added a fear of each repeated ordeal. Ovarian deficiency was known to increase autonomic nervous irritability, but this did not account for many cases of dysmenorrhoea which occurred at a time of high-oestrogen levels. He regarded the fact that dysmenorrhoea was uncommon at puberty and might only occur after several years of painless menstruation or after the birth of children, as being evidence of a regression to earlier psychosexual levels with the activation of conflicts which were reflected in an over-reaction to the premenstrual hormonal changes.

Conclusions. The factors underlying dysmenorrhoea are complex. It would appear certain that ovulatory cycles and therefore a reasonably normal hormonal balance, must be present. It is thus a phenomenon associated with normal, rather than abnormal, menstrual function. Dysmenorrhoea of a severe enough type to be

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incapacitating occurs in a certain proportion of normal women, but there is a correlation with neurosis and personality disorder which suggests that certain distinctive types of underlying psychopathology, i.e. resentment of the feminine role, must be an important factor in the condition. Once established, the repeated process of painful stimulation may lead to conditioning and the formation of a pattern of pain which becomes autonomous in the cerebral cortex. The actual mode of production of the pain is not fully understood. It may be that it is a psychosomatic effect mediated via the autonomic nervous system (TAYLOR, 1949). The fact that a secretory type of endometrium is usually present suggests that progesterone may play a part in the causation of pain.

(c) *Premenstrual tension*

Many authors have described psychiatric symptoms in relationship to the premenstrual phase of the cycle, but the first description of the syndrome as a definite entity was made by FRANK (1931). He described a syndrome developing during the second half of the menstrual cycle and characterized by tension, irritability, swelling of the abdomen and limbs, itching, thirst, and various tendencies to migraine, asthma, and epilepsy.

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MORTON (1950) studied 29 cases of premenstrual tension in an attempt to demonstrate the main physiological changes which took place. He subjected each patient to a large number of procedures including endometrial biopsy, vaginal smear, hormone assay, serological tests, and glucose tolerance curves. His findings were as follows:

1. Failure of the usual midcycle rise in the temperature chart associated with ovulation.
2. The endometrium during the premenstrual phase was either proliferative and hyperplastic or proliferative-secretory in type. The usual secretory type of endometrium did not occur.
3. Assay of urinary hormones showed a subnormal pregnandiol excretion.
4. Increased capillary permeability.
5. Subnormal urinary output.
6. Increased glucose tolerance as a low or plateau-like curve.

He postulated that these findings indicated progesterone deficiency accompanied by the circulation of unantagonized oestrogens which in turn gave rise to fluid retention and increased epithelial proliferation.

REES (1953) gave a detailed account of the syndrome. He investigated the relationship between premenstrual tension and neurosis or neurotic predisposition by comparing a group of normals with a group of neurotics. His results showed a significant increase in the incidence and severity of premenstrual symptoms in the neurotic group. The results were as follows:

TABLE 4.—THE INCIDENCE OF PREMENSTRUAL TENSION IN NORMALS AND NEUROTICS (REES, 1953)

Degree of tension	61 normals	84 neurotics
None	78·7%	38%
Moderate	16·4%	30%
Severe	5%	32%

A significant result was also obtained by comparing the degrees of tension with the degrees of neurotic constitution as previously defined by SLATER. The result was as follows:

TABLE 5.—THE INCIDENCE OF PRE-MENSTRUAL TENSION RELATED TO DEGREE OF NEUROTIC CONSTITUTION (REES, 1953)

Degree of neurotic constitution	Degree of premenstrual tension		
	Nil	Mild	Severe
Nil	76%	17%	7%
Mild	56%	36%	8%
Severe	15%	48%	37%

It will be seen from these results that the incidence of tension increases parallel with the degree of neuroticism, and in addition the proportion of cases of severe tension is significantly higher in the group of those with severe neurotic predisposition. He obtained similar results by comparing the degree of tension with the severity of the neurosis. Despite this, he found some women with no evidence of neurosis had severe premenstrual tension and conversely some severe neurotics had a complete absence of tension.

Discussing the significance of his findings, REES noted that the known physiological changes at the premenstrual phase, such as oedema, oliguria, hypoglycaemia, haemoconcentration, etc. were all similar to those which were known to occur during the alarm reaction phase of the general adaptation syndrome. It was also known that oestrogens could produce similar manifestations. This agreed with the belief first introduced by FRANK (1931) and later ISRAEL (1938), that premenstrual tension was due to the circulation of unantagonized oestrogens. The autonomic overactivity at the premenstrual phase might be due to the overproduction of acetylcholine, which was known to be produced in larger quantities in the presence of oestregon. Treatment with hormones or anti-diuretics sometimes improved the physical distress, but not the tension. Similarly, psychotherapy might modify the patient's attitude to premenstrual tension but did not necessarily cure it. REES postulated a bodily change as primary, but inferred that the woman's general stability and tendency to neurosis determined her reaction to these changes.

GREENE and DALTON (1953) summarized the literature concerning premenstrual tension. They noted that the evidence for this syndrome being the result of hormonal imbalance, must be weighed with care. One of the chief difficulties was that of accurate hormone assay. The association of oliguria and weight-gain, which had commonly occurred in the premenstrual phase, had been an indication that water retention was an important factor in the condition. The success which various authors noted from the use of a number of different diuretic substances supported this postulate. This did not account for cases of midcycle tension which occurred at a trough in the weight chart. Metabolic studies had shown some evidence of sodium retention being the cause of the water retention. This was possibly caused by excess oestrogen levels in the blood. The relief of tension by the use of ethisterone in some series may have been brought about by the effect of this substance in promoting oestrogen excretion. They analysed 84 cases of premenstrual tension. The majority of these subjects had had a normal menarche (aet. 11–16), average menstrual loss, and a regular cycle. Headache was the commonest presenting symptom. After childbirth the syndrome often became more severe.

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They treated their patients with ethisterone either by the oral or intramuscular route, and in some cases used implants. 44 subjects received 30–150 mg for 12 days from the fourteenth day of the cycle. There was complete relief of symptoms in 47% and partial relief in 17% of cases. Of 14 patients who failed to obtain relief with oral ethisterone, 9 had complete relief with the intramuscular preparation. 61 patients received ethisterone by the intramuscular route. 83% of these had complete relief and 6% partial relief of symptoms. 28 subjects received implants of 200–500 mg, and of these, 96% had complete relief of symptoms.

G. I. M. SWYER (1955), discussed the effects of ethisterone and also of mephenesin in the treatment of this condition. 24 women were given four consecutive treatments, each of which was administered during the 10 days following the fifteenth day of the cycle for four consecutive cycles. The results showed that both ethisterone and mephenesin separately were associated with partial or complete removal of symptoms in 60% of the patients. The two drugs combined did not cause a noticeably greater number of improvements, but either one or other of the two drugs caused an improvement in 90% of cases. Improvement with a placebo occurred in considerably fewer cases.

He concluded from these results that hormonal imbalance was not the sole factor responsible for premenstrual tension, and presumed that in some cases psychological factors manifesting themselves as tension states played an important part in the causation of the syndrome.

Conclusions. There would appear to be clear evidence that a physiological syndrome of water-retention, change in plasma constituents, increased glucose tolerance, and lowering of urinary pregnandiol levels occurs in the premenstrual phase. This would be consistent with a hormonal imbalance resulting in progesterone deficiency and the circulation of unantagonized oestrogens. The successful results of treatment by means of diuretics, progesterone, and ethisterone support this hypothesis. The increased liability of neurotics to suffer from premenstrual tension is attributable to an undue sensitivity to the underlying physiological change. The results of SWYER (1955) suggests that treatment of anxiety and tension is as important as an attempt to right the hormonal balance.

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3. MENSTRUAL DISTURBANCE IN PSYCHOSIS

(a) *Studies of menstrual disturbances in psychotics*

Formerly it was believed that insanity was caused by blood being driven inwards, following cessation of the menses, and finally going to the head. The first studies of menstruation in the abnormal, undertaken towards the end of the last century, perhaps reflect this belief in the uncertainty which existed as to whether menstrual disturbance itself was the cause of psychoses.

SHROETER (1874) observed that amenorrhoea was a common event at the onset of a psychosis. Resumption of normal menstruation occurred either before, at the time of, or shortly after any sign of clinical improvement. Patients who failed to recover showed a tendency to resumption of normal cycles after a period of time in hospital. He regarded the occurrence of amenorrhoea in a patient who had made a clinical recovery as a sign of doubful prognosis. The association of menstrual disturbance with the psychiatric disturbance led him to postulate that the menstrual disturbance might be the causative factor in the illness. HAYMANN (1913) noted that amenorrhoea occurred most frequently during the first two months after the onset of a psychosis,

and assumed from this that the menstrual disturbance would therefore not be the primary cause. He noted a relationship between the severity of the psychic disturbance and the duration of the amenorrhoea, and regarded the latter as being of equal importance to weight-gain and loss as a prognostic indicator. JOLLY (1915) noted similar relationships, and found amenorrhoea to be common in psychoses of acute onset, but noted that it also occurred occasionally in chronic psychotics. He found the incidence of amenorrhoea in acute cases to be 66% as opposed to 33% in chronic cases.

HANSE (1923) studied 430 psychotics over a period of 5 years. His criterion for amenorrhoea was 90 days' absence of the menses. He noted that amenorrhoea usually occurred shortly after the onset of the illness, and chiefly in patients in whom there were strong affective tensions such as fear and anxiety. Resumption of menstruation occurred both with improvement in the mental condition and also in patients who became chronic psychotics. As a rule he found patients with normal cycles to show an absence of strong affective disturbance. He emphasized that prognostic conclusions could be not drawn from the data in his series.

The incidences of amenorrhoea obtained by these observers are tabulated below:

TABLE 6.—INCIDENCE OF AMENORRHOEA IN PSYCHOTICS

	Catatonia	Hebephrenia	Paranoia	Melancholia	Manic-depressive states	Hysteria
HYMANN	93%	50%	50%	60%	60%	—
JOLLY	52%	48%	9%	51%	31%	7%
HANSE	62%	50 %		60%	45%	9%

Both HEALEY (1928) and MUSKENS (1928) described an association between epilepsy and menstruation. This consisted of:

1. Commencement of fits at the menarche and cessation of fits at the menopause.
2. Fits occurring either solely or more frequently at the time of menstruation or in the premenstrual phase.

STRACHAN and SKOTTOWE (1933) compared their findings in 250 psychiatric patients admitted to hospital, with those in 1000 gynaecological patients in good mental health. The incidence of abnormalities was: menorrhagia 7·5%, oligomenorrhoea 6·9%, amenorrhoea 11%, dysmenorrhoea 3·2%; 36 patients showed exacerbation of symptoms at the time of the menses.

In the group of gynaecological patients, the incidence of abnormalities was as follows: menorrhagia 1·3%, oligomenorrhoea 1·3%, amenorrhoea 1·9%, dysmenorrhoea 10%.

They concluded that psychiatric patients showed menstrual abnormality more commonly than gynaecological patients. but that those abnormalities were not considerable.

RIPLEY and PAPANICOLAOU (1943) studied the menstrual cycle in 221 patients, of whom 114 were schizophrenics, 81 depressives, and 26 manic. The time of study varied from 2 to 22 months and the age of the patients between 13 and 40 years. They disregarded data obtained in the case history as

unreliable. They studied the frequency distribution of the cycle, expressed as the percentage of total intervals against length of cycle in days, and in addition obtained critical ratios by dividing the actual difference in percentage by the standard error of the difference between two percentages. The figures they obtained showed an increased standard deviation from the mean length of cycles and also increased mean length of cycles. Cycles of 35–59 days occurred in 31% of schizophrenics, 33% of depressives, and 19% of manics. They regarded an interval of 60 days or more as constituting amenorrhoea, and found the latter to occur in 18% of schizophrenics, 14% of depressives, and 12% of manics.

They also performed vaginal smears in 31 patients, and found:

1. Those with normal menses showed well-expressed follicular reactions.
2. There was frequent delay in the appearance of the follicular phase.
3. In cases with long intervals, follicular reaction was either absent or poorly expressed.
4. In cases of amenorrhoea the appearances were those of a secondary amenorrhoea.

They postulated the following mechanism:

1. A mild and temporary disturbance retards the normal development and maturation of the follicles.
2. A stronger and more prolonged disturbance further suppresses follicular growth and delays the menstrual cycle.
3. Short cycles are probably due to a stronger and more abrupt effect causing involution of the follicles.

It appeared that it was more the severity of the illness rather than the emotional disturbance which was related to the degree of abnormality of the menses. No particular type of menstrual abnormality coincided with any particular disease.

In addition, they compared their figures with those of normals compiled by Arey (1939). The results are shown in Table 7 below:

TABLE 7.—MEAN AND S.D. FROM THE MEAN IN PSYCHOTICS COMPARED WITH NORMALS

		Mean length of cycle (days)	Standard deviation	Coefficient of variation
Ripley and Papanicolaou	Schizophrenic	31·1	16·7	53·65
	Depressed	29·7	14·57	49·06
Papanicolaou	Manic	29·7	13·52	45·52
Arey	Normals	28·4	4·92	17·03

The size of the coefficient of variation shows that there is considerable variation in all groups, but especially in the abnormal groups, each of which is three times as variable as the normal group.

Conclusions. Certain relationships between psychosis and the menstrual cycle appear to be fairly well established. Amenorrhoea is the outstanding abnormality which is to be found. It may occur at any time during a psychosis, but in particular during the acute phases and at the onset of the illness. It occurs in all types of psychosis but in particular is associated with catatonia and is generally present during the stuporose phase of the latter condition.

There is a relationship between recovery from the acute phase of a psychosis and re-establishment of normal menses, but the latter may also occur with chronicity. Psychotic symptoms often occur at the time of menstruation or during the pre-menstrual phase. The degree of emotional disturbance present is not necessarily related to the degree of menstrual disruption. A tendency to menstrual abnormality is

present in the prepsychotic phase as well as after the onset of florid psychotic symptoms. The variability of cycle is significantly greater in psychotics than in normals. Prognostic conclusions are evidently not to be drawn without surveying all the clinical evidence available. Resumption of normal menstrual function at a time when recovery from the psychotic symptoms is taking place would imply a good prognosis, but resumption of normal menses without other clinical evidence of recovery could not be regarded as of prognostic significance.

(b) *The menstrual psychosis—psychoses of hormonal origin*

Throughout the literature there are references to a so-called menstrual psychosis.

JOLLY (1915), who had noted that some psychotics showed a close relationship between their symptoms and the premenstrual phase of the cycle, concluded that despite this there was no definite clinical entity which could be termed "a menstrual psychosis." VON STAABS (1939) studied a few individual cases in whom he believed there to be a clear relationship between the menses and the psychiatric condition. He defined the menstrual psychosis as a definite clinical entity which "is connected with the menses, arising like a foreign body from the personality, showing certain psychotic symptoms according to the disposition of the individual concerned, exhibiting no special preference for any age group, occurring in people with no previous psychotic peculiarity, in which the core of the personality is left unaffected, and the symptoms of which begin to pass with the time of the menses." He believed the phenomena were not to be construed as a kind of psychic reaction to the experience of menstruation, but were caused by the direct endogenous effect of the menses.

KRAINES (1948) referred to a "menstrual psychosis," but made it clear that if it existed it occurred in women of morbid prepsychotic personality. In this connection he describes cases of catatonic excitement recurring at the menses, with remission of symptoms in between each cycle. It appears that the evidence for the existence of a menstrual psychosis is at the present time based on the study of a few individual case histories. Beyond this there seems to be little support for the concept, although many authors refer to psychoses which become exacerbated at the time of, or just prior to, the menses.

There are various reports of psychoses reputed to be of hormonal origin.

HAMBURGER and COURTIN (1939) described a case of hallucinatory psychosis in which clinical improvement followed the use of progesterone. TOMORUG and ORBESTEANU (1939) treated a 15-year-old schizophrenic with a history of menorrhagia. Both the latter symptom and all signs of her psychosis disappeared after a course of injections with pituitary extract. BARUK, RACINE, and LEURET (1940) postulated a relationship between hypersecretion of folliculin at the menopause and the increased incidence of hallucinatory and persecutory types of psychosis at this epoch. They postulated a vasodilatory effect attacking the whole cerebral vascular system. BILLIG and BRADLEY (1946) observed that some of their patients experienced a reactivation or exacerbation of their psychoses during the premenstrual phase of the cycle. They treated 12 of these patients with insulin, ECT, or mentrazol, and followed this by giving them progesterone from the twelfth to fourteenth day of the cycle onwards. In these patients there was a high degree of social improvement, and freedom from symptoms which they related to the effects of progesterone therapy. They considered the latter to have succeeded where both ECT and insulin had previously failed.

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KNAUS (1948) carried out an analysis of the periodicity of acute psychotic disturbance in a schizophrenic woman and co-ordinated it with the menstrual cycle throughout a year. He found marked psychotic symptoms during each premenstrual phase and disappearance of the symptoms following the onset of bleeding. He believed this to be an effect related to the activity of the corpus luteum via the hypophyseal diencephalic system. He treated the patient by giving a large quantity of blood intravenously from a pregnant woman. There was a prompt recovery from all symptoms, and no further attacks occurred for several months. He believed this was brought about by the effects of the large quantity of gonadotrophic hormone present in the blood.

Conclusions—It is evident that the concept of a menstrual psychosis can now be abandoned. No convincing evidence has been produced to show that such an entity exists. This view is now reflected in current textbooks of psychiatry and medicine.

RIPLEY and PAPANICOLAOU (1943) have demonstrated in a convincing manner that there is evidence of ovarian deficiency during the acute phase of psychotic illness. This disturbance is consistent with the syndrome of hypothalamic amenorrhoea described previously. The concept of psychoses of hormonal origin is a complex one. Most of the work on this subject has been on individual cases. It would seem unjustifiable to draw several conclusions from such reports as those describing improvement in a single individual following the use of hormonal extracts. The series described by BILLIG and BRADLEY (1946), using progesterone, is of more interest. The results would be more significant, however, if their patients had not already been treated by ECT and insulin previously. Apart from any contributory effect played by the latter methods of treatment, it is evident that all their patients had more than the usual amount of treatment and observation, and this factor in itself may have played a part in promoting recovery.

At the present time it would seem more consistent with what is known of relationships between the C.N.S. and the endocrine glands to state that of the various hormonal changes which have been observed in psychotics, the majority are a sequel to the C.N.S. disturbance, i.e. ovarian deficiency following hypothalamic amenorrhoea.

That the endocrine changes themselves may play a part in the causation of psychosis remains a possibility which has not been adequately demonstrated. It is possible to conceive of a psychic disturbance which results in interference with endocrine function. The latter might then either perpetuate the original disturbances or cause psychotic states.

There is certainly evidence that both over- and under-secretion of endocrine glands can be associated with psychosis, i.e. psychosis associated with myxoedema and thyrotoxicosis. However, apart from cases of this type associated with a known deficiency or a known over-secretion, there would appear to be no conclusive evidence that psychosis occurs secondarily to hormonal disturbance. In fact, it is more probable that the endocrine changes observed in psychotics are a sequel to, rather than a causative factor in, their illness.

4. MENSTRUAL DISTURBANCE FOLLOWING SHOCK TREATMENT

The effect of ECT on the menstrual cycle

The increasing use of ECT, deep insulin, and leucotomy during recent years has made available a few studies of the effects of these forms of treatment upon the menstrual cycle.

KALINOWSKY and HOCH (1946) noted that menstruation often ceased during the administration of ECT and returned about 2 months after successful treatment. In those patients in whom amenorrhoea had occurred previous to treatment, resumption of normal menses often resulted when the treatment itself had been successful. They instanced many cases of involutional psychosis. They believed that the effect of treatment was to influence menstruation directly via the diencephalic centres. They found amenorrhoea occurred as a response to ECT in both psychotic and neurotic patients. DELAY, SOULAIRAC, RIVIERE, and CORTREL (1944) studied the effects of ECT on the menstrual cycle. They found evidence of menstrual disturbance in 20% of 145 patients following ECT. This disturbance either took the form of change in cycle length or in actual amenorrhoea. 13% of the patients became amenorrhoeic.

MICHAEL (1954) studied the effects of ECT and deep insulin on the menstrual cycle in 687 patients in the New York Psychiatric Institute between 1942 and 1949. Correlation of cycle length with age was negative ($r = -0{\cdot}21$) and of doubtful significance (standard error = 0·05). Amenorrhoea was the most conspicuous finding. After ECT he noted both lengthening and shortening of the cycle. The average cycle length was little changed unless ten or more ECT's were given.

The average length of all cycles during treatment was correlated with the number of treatments received. A positive correlation was shown to occur in 199 patients receiving ECT alone ($r = 0{\cdot}34$; probable error, 0·042), while a higher positive correlation was obtained in the case of 128 patients who received both ECT and deep or modified insulin ($r = 0{\cdot}58$; probable error, 0·04).

The time elapsed between completion of ECT and return of menses was not found to be related to the time elapsed from previous menses or to the termination of treatment. A frequency distribution curve of the time elapsed between cessation of treatment and recurrence of menses showed a peak at 24–30 days, and another smaller peak at 7–8 days. The return of menses after ECT was found to be directly related to the number of treatments given. The more treatments, the longer the interval. He assumed a cumulative effect. Correlation was lower with ECT alone then when ECT was combined with insulin.

He noted the following patterns of response:

1. Complete absence of menses throughout treatment.
2. Shortening of the first cycle to 24 days or less (a) followed by a cycle of greater length than 30 days, (b) followed by a normal cycle of 25–30 days.
3. A normal 25–30-day cycle followed by prolonged amenorrhoea.
4. Two prolonged cycles.
5. Two normal cycles.

In general, he found the second cycle to be longer than the first. Only 26 out of 150 patients had a second cycle shorter than the first. Of 26 patients amenorrhoeic at the time of treatment, 8 resumed normal cycles either during or after their treatment. Combination of ECT with insulin enhanced the chances of amenorrhoea. The average interval between termination of treatment and resumption of menses in 103 patients receiving an average of 14·99 ECT's was 26·32 days. The figure for 106 patients receiving an average of 14·99 ECT's and insulin therapy was 36·36 days. The difference between these two means was significant at the 0·01 level ($T = 3{\cdot}36$). In an interpretation of his results he noted that although amenorrhoea does arise sometimes following abdominal operations, it is generally presumed nowadays to be caused by a disturbance of pituitary function. He referred to animal experiments which showed some confirmation of the pituitary being the site of action for ECT.

ROSVOLD (1949) administered ECT to rats, and found that he could interrupt pregnancy by giving five treatments between 0 and 48 hours after insemination. If the ECT was given later than this, pregnancy was not interrupted. It was therefore presumed that once a luteal-decidual relationship had been established, the process became independent of pituitary hormone secretion.

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MICHAEL postulated that the peak of 24–30 days between treatment ending and resumption of menses was an indication that the ECT effect was to cause a hypothalamic type of amenorrhoea. He believed that the short premature cycles were being caused by pituitary disturbance leading to a sudden withdrawal of hormonal support. He also postulated a possible stimulatory effect on the pituitary secretion of FSH which led to increased hyperfolliculization and oestrogen secretion, which in turn caused suppression of LH and thence to amenorrhoea. He believed the peak at 7–8 days after cessation of treatment to be an indication of this. The latter only occurred in a few patients, and he therefore assumed that inhibition was the main effect. The variable results indicated that not all patients were equally sensitive to ECT.

Finally, he posed the question: was there a common denominator to clinical improvement and menstrual disturbance, a centre in the brain which was common to both?

Conclusions—ECT and deep insulin treatment are associated with a disruption of the menstrual cycle, which becomes progressively more marked as the number of treatments increases. The chief effect is to cause prolongation of the cycle and amenorrhoea, but in some instances shortening of the first cycle following treatment is the first effect and is then usually followed by a cycle of greater length. The effect is probably produced by a disturbance of the hypothalamic controlling mechanism which results in cessation of the secretion of pituitary gonadotrophic hormones. There is also a possible stimulating effect which results in increased secretion of FSH, and ultimately suppression of LH. Despite this disturbing effect upon hypothalamic function, the use of ECT and insulin in patients who have been previously amenorrhoeic may be to precipitate the resumption of normal menses.

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ANNOUNCEMENT

DURING the summer of 1956 "La Société Francaise de Médecine Psychosomatique" was created in Paris. Its aim is to promote scientific research in psychosomatic medicine.

The Bureau of the Executive Board of the Society is composed of Dr. F. MOUTIER, President; Prof. G. HEUYER and Dr. M. BOLGERT, Vice-Presidents; Prof. P. ABOULKER, Secretary-General; Dr. L. CHERTOK and Dr. M. SAPIR, Secretaries; Dr. CH. BRISSET, Treasurer. The other members of the Executive Board are: Dr. P. CHENE, Prof. J. DELAY, Prof. A. DELBARRE, Dr. de GRACIANSKY, Dr. R. HELD, Dr. MONTASSUT, and Dr. G. NORA.

The Society wishes to establish scientific collaboration with other societies, groups, and individuals interested in the exchange of information in the field of psychosomatic medicine.

Address all correspondence to: Dr. L. CHERTOK, Centre de Médecine Psychosomatique, 54 Avenue de la République, Villejuif (Seine), France.

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CONFERENCE

THE Third European Conference on Psychosomatic Research will take place in Copenhagen on Wednesday the 8th of May, 1957, Thursday the 9th, and Friday the 10th, and possibly Saturday the 11th.

The main topics of the conference will be:

Adipositas, a planned discussion based on the theory of HILDE BRUCH.

Anorexia nervosa.

Therapy of psychosomatic disorders.

Conditioning.

A section of free papers will be arranged too.

The language of the conference is English, but a speaker may speak in French or German if a paper in English is available for all the congress members throughout the speech.

EDITORIAL

IN this issue we publish a series of papers from the Psychosomatic Research Group in Amsterdam. This Group has played an important part in the development of psychosomatic medicine on the Continent of Europe. An account of the origin and development of the Group is given by Dr. J. GROEN, its director. In a further paper, GROEN sets out some of the ideas which he has developed as a result of the deep thought he has given to his subject. Original communications follow, and we are also publishing a bibliography of the work which has come from the Group, largely to draw attention to the Dutch literature in this field.

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J. Psychosomatic Res., 1957, Vol. 2, pp. 82 to 84. Pergamon Press Ltd., London

SOME NOTES REGARDING THE ORIGIN AND DEVELOPMENT OF THE PSYCHOSOMATIC RESEARCH GROUP ATTACHED TO THE SECOND MEDICAL SERVICE AND THE DEPARTMENT OF NEUROPSYCHIATRY IN THE WILHELMINA-GASTHUIS, AMSTERDAM

J. GROEN, M.D.

DR. ALLEN GREGG, at present Vice-President of the Rockefeller Foundation, a man who has been responsible for more "work behind the scenes" in medical research than almost any other living person, was perhaps one of the first to realize that methods of modern clinical investigation should and could be applied to problems of mental disease. The author, impressed by Dr. GREGG's vision, was therefore deeply interested when DRAPER, FLANDERS DUNBAR, ALEXANDER, and MURRAY published their pioneer studies on the role of psychological factors in the aetiology and course of internal diseases. No systematic work was done, however, until 1940, when the invasion of The Netherlands by the German army and the subsequent establishment of the Nazi regime forced the author to resign his position in the University of Amsterdam and the Wilhelmina Hospital, and reduced his medical activities to a small private practice. It occurred to him that it might be worthwhile, during this period of forced inactivity, to make a study of psychosomatic relationships in his patients in a more systematic way than it had been possible for him before. The method used was that of the *biographical anamnesis*, and from 1941 to 1945 about eighty patients, suffering from all types of internal diseases, were studied in this way. From these studies emerged the tentative conclusion that, at least in some diseases, there were direct relationships between personality "traits" and emotional conflicts and the occurrence and course of the disease. Moreover, these personality traits and the emotional conflicts to which they predisposed the patients seemed to be more or less specific for each disease. An inability to solve inter-human conflicts by action or speech, or some other form of active "abreaction" was a further finding in these patients. It seemed as if the control or repression of the emotional conflict and the inhibition of a motor or verbal discharge, precipitated the onset of the somatic disorder. An unsuspected and surprising finding was the rapidity with which sometimes "spontaneous" improvements occurred when the patient's life situation delivered him from his unsolved conflict. These observations were made especially in patients with ulcerative colitic, peptic ulcer, bronchial asthma, hypertension, exophthalmic goitre, and some of the so-called functional disorders.

With the end of the war, the author was happy to discover that important research in this field, which was by now called "psychosomatic medicine," had been going on in the U.S.A. during those years. In addition to the pioneer psychiatric studies, the work of HAROLD WOLFF and STEWART WOLF seemed to point the way to putting the impressions obtained from the biographies and clinical observations to a more scientific test. The return of the author to the Wilhelmina Gasthuis, in charge of the Second Medical Service, and the interest of Professor VAN DER HORST (recently

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appointed to the Chair of Psychiatry in the University of Amsterdam) in psychosomatic relationships, offered an opportunity for a combined medical and psychiatric approach It was a fortunate circumstance that Dr. J. BASTIAANS, who had been connected as resident with the Second Medical Service for a year, and was undergoing a psychoanalysis, decided to enter the Department of Psychiatry and was later delegated by Professor VAN DER HORST to the Medical Service to take part in the psychosomatic researches.

The insight that experimental and clinical psychology might also offer possibilities of testing some of the clinical impressions and psychiatric hypotheses, induced the author to associate a psychologist with these studies; as such, Dr. S. J. VLES was attached to the group. Finally, Dr. J. M. VAN DER VALK joined the team as physiologist. From 1947 onwards the project was made possible by a grant from the Rockefeller Foundation and the co-operation of the municipal hospital authorities. The program was essentially the same as that which the author had begun, but more particularly to test the hypothesis of psychosomatic specificity with regard to psychosomatic relationships in ulcerative colitis, peptic ulcer, bronchial asthma, and essential hypertension. As a methodology, it was agreed that psychiatric methods could never furnish us with more than concepts or hypotheses. Without taking an a priori standpoint in issues such as pro or contra psychoanalysis or phenomenology as complete systems of thought, it was further felt that those parts of these systems that lent themselves to testing by independent methods could be regarded as fruitful, and therefore acceptable for further studies. More theoretical concepts for which no method of testing was available were better left untouched for the time being. This principle has not always been easy to fulfil in practice and the group has had to conquer many difficulties and controversies both from outside and among its members, reflections of the many controversial issues that exist between medicine and the various schools of psychiatry in our day.

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Dr. VLES was succeeded by Dr. J. T. BARENDREGT. Dr. H. E. PELSER and Dr. E. DEKKER later joined the group as clinical investigators. Several psychiatric residents have since spent a 3- to 6-months period with the group.

In addition to the original programme, an investigation was carried out on the importance of psychological factors on the course of pulmonary tuberculosis, in which the chest physician, Dr. A. S. GROEN, and his wife, the psychiatrist M. GROEN-VAN BEVERWIJK, participated. Dr. CORNELISSEN made a study of emotional factors in patients with gall-stones, and Dr. D. de JONGE, a sociologist, made a comparison of the social situation in patients with asthma compared to healthy individuals. Dr. D. BROUWER studied body-build in relation to disease.

Besides regular staff meetings to discuss cases and reports, seminars have been held for the combined staff meetings of the medical and psychiatric departments. Two years after the beginning of the research a more systematic approach was made to investigate the effect of various forms of psychotherapy in patients with internal diseases, especially in ulcerative colitis, peptic ulcer, and bronchial asthma. In this last condition, psychotherapy has been given a special trial.

The group is still primarily a research group. It is not available for routine treatment of cases; indeed, the magnitude of such a task would be beyond its possibilities. Neither does any systematic teaching of the medical students take place, although Professor VAN DER HORST incorporates psychosomatic medicine in his

lectures on clinical psychiatry. In 1956, however, a special course of one week was given for the medical students of the University of Amsterdam during the Christmas vacation, which demonstrated that such teaching is feasible and is generally appreciated by the students. Lectures and seminars have been held by members of the group for students, societies, nurses, and social workers, and many medical societies in different parts of the country. A special program of postgraduate teaching for family doctors is in preparation; the widespread occurrence of psychosomatic disorders makes this field of special importance for the family doctors, and their response to our work has been most encouraging. There has also been regular contact with psychiatric and psychoanalytic societies, for which papers were read by members of the groups. As more centres for psychosomatic research were established elsewhere, a fruitful co-operation developed, and in April 1956 the Amsterdam group had the honour of acting as host to the participants of the Second European Conference on Psychosomatic Research.

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J. Psychosomatic Res., 1957, Vol. 2, pp 85 to 96. Pergamon Press Ltd., London

PSYCHOSOMATIC DISTURBANCES AS A FORM OF SUBSTITUTED BEHAVIOUR*

J. GROEN, M.D.†

INTRODUCTION

THE discovery, or rather the scientific rediscovery, that emotional processes can produce or intensify somatic disorders has confronted our medical thinking with a fundamental problem. In the course of the nineteenth century it had become an almost unchallenged axiom that the study of disease could be approached from two completely different points of view: the organic approach, according to which only material causes were recognized as able to produce organic disease, or the psychological attitude, according to which mental processes could produce functional disorders only. Modern psychosomatics has demonstrated that this distinction is not in harmony with the observed facts: Emotional processes can produce and influence organic illness, organic disturbances can produce mental disease. Psychosomatic medicine, which has chosen these psychosomatic and somatopsychic interactions for its field of study, is in need therefore, not only of a special methodology, but also of a system of thinking that will allow us to express observations and hypotheses about these interactions in a more fruitful form. In trying to work out such a system of thinking, it is well to realize that no science or philosophy has ever achieved a universal system of reference that satisfied all workers at all time. Rather than seeking a universal approach of the body-soul–environment problem, that would satisfy philosophers, psychiatrists, psychologists, as well as biologists, physiologists, clinicians, and if possible also sociologists and anthropologists, it has been the purpose of some of us in the past decade to fit facts and hypotheses in a framework that would prove its value by being *fruitful*. Under fruitful we understand a system of reference that: (1) allows a definition of scientific terms that satisfies the greatest number of workers from different fields; (2) allows the formulation of hypotheses in such a form as will make them suitable to be tested by the application of scientific methods and thus (3) leads to an extension of our presently too limited factual knowledge.

It is recognized that as far as is universally concerned, philosophy in general, and within its frame the modern system of phenomenological anthropology, aims at higher ideals than the biosociological concept of man and his nature. But this need not mean a contradiction *per se* between these approaches and their results. It is becoming more and more clear that it depends on our method of approach, whether man appears as a unique phenomenon in his existence in communication with his fellowmen, or whether he is a biosocial unit with an exceedingly rich and complicated structure and function, communicating with his fellow men as part of the whole of nature and society. Each point of view, that of the phenomenological anthropology or of the human biosociology, stands in its own right. If, therefore, in this lecture an attempt

* Chairman's address before the Second European Conference on Psychosomatic Research, Amsterdam, 17 April 1956.

† Holding a grant from the Rockefeller Foundation. From the Second Medical Service of the Wilhelmina-Gasthuis (Pavilion 7), Amsterdam, the Netherlands.

will be made to outline a biosocial view on man and his nature, this is not meant as a depreciation of other concepts. On the contrary, in the research group to which the author has the honour to belong, other ways of approaching man in health and disease are equally represented. But to a physician whose training and daily occupation are concerned with the application of scientific investigation to the study of disease, it is more natural to outline a view (which has evolved from work done in other centres as well as in our Amsterdam unit), which has shown its fruitfulness in the sense defined above. It has been specially gratifying that this system has made it possible to unite psychiatrists, psychologists, physiologists, biologists, clinicians, and sociologists as a research group, with a minimum of controversy and misunderstanding.

The author and his colleagues are well aware that the views presented in this paper cut across some of the traditional classifications and aetiological concepts of present medicine and psychiatry. They form a proposal for a more uniform system of references, that is offered to the constructive criticism of a conference that unites research workers from different disciplines.

MAN AS A BIOSOCIAL UNIT

In the class of mammals, man is characterized amongst others by his erect gait, the scarcity of hair, the typical structure of the hand, enabling him to use tools, and the mighty development of the cerebrum, especially that part which we call the frontal brain. Man is a mammal living in social groups. This living in groups has made it possible to develop certain innate neuromuscular potencies so that speech and, later, writing and reading evolved, indispensable bases for the development of thinking and for the transference of experience and knowledge to other groups and to following generations. The ability to control micturition and defeacation, necessary for life in a stationary community, should also be mentioned. Another characteristic of man is the unusually long period during which the human young requires feeding, care, and protection by the parents. During this long period of dependency it is inevitable that the human child experiences frustrations in his natural biological tendencies, not only from the encounter with his external environment, but also because these tendencies are counteracted by the same parents on whom he is otherwise dependent and, later, by the members of the same group with whom he has to live in community. In western culture this period of dependency is longer than in the so-called primitive cultures of a lower technical development. Another feature of biological and social importance is the fact that in western culture man develops into biological maturity (i.e. the ability to produce ova or spermatozoa) before he becomes economically mature and able to take care of his offspring. This has made it necessary, for social reasons, to frustrate the western individual in his or her sexual activity, at least during childhood and adolescence.

From these short considerations two conclusions emerge: In the first place that man, as indeed every socially living animal, in his development and during his adult life is restricted in the possibilities to live out his natural tendencies not only by the physical (geographical, climatic, etc.) limitations of his environment, but also, and even to a higher degree, by the behaviour of his fellow men. The society in which the human being is born and in which he has to live is not only a physical or biological environment, it is a culture, a community where patterns of life are regulated

only partly by the biological nature of man and the environmental, climatic, and geographical conditions, but mostly by social, i.e. economic, national, and religious conditions, customs, and laws, written and unwritten. In this situation man has to find a way of life which provides him with opportunities to satisfy his natural "innate" drives, without entering into conflicts with his fellow men who are also driven to live out their drives and desires. Every culture can be regarded as a constellation in which a certain compromise is achieved between the human behaviour as induced by its natural drives, and the social tendency towards stabilization of permitted and required conduct. In this constellation, to which the young individual must learn to adapt himself, parents, siblings, and, in later stages of his development and maturation, an ever widening circle of key figures, function both as protectors, allies, and teachers, and as competitors and opponents. Thus man's development and behaviour is never understandable along biological lines only. He is a biosocial individual.

The other conclusion, however much deplored by some well-meaning educators, is that frustration *per se* is actually a normal phenomenon in human development, as, incidentally, students of animal behaviour know perfectly well that it is for animals. We are faced with the interesting phenomenon that frustration, which doctors and psychiatrists usually regard as being responsible for disturbances both in mental and somatic development, is, speaking generally, an inevitable concomitant of life; it is actually a driving force, indispensible in development towards a maturity which is both biologically and socially adjusted. We have all been through frustrations, we have survived them, and we keep on surviving in spite of frustrations. In some respects the process leaves us with scars and damage, but in other respects frustration is responsible for some of the greatest achievements of man in his various patterns of culture.

How does man achieve this adaptation to an environment which is partly satisfying, partly frustrating? By a process which in its generality can best be designated as *substitution*, which leads him along other forms of activity to gratification of his frustrated natural drives. *Drives are only potential activities, which can be satisfied in many ways*, discharged along different pathways, depending on the individual's inherited characteristics, on the stage of his development and maturation, on his former and later experiences, as well as on the objects and opportunities offered by his environment, especially by the key figures, among whom he lives. Processes such as "imprinting," conditioning, learning, displacement, redirection, sublimation, or regression, have all in common the fact that some pattern of behaviour is acquired and acted out, which, although different from the gratification of the "original" drive by the specific consummatory behaviour, discharges the instinctual energy in other, usually indirect, forms which may also lead to gratification. It is through this principle of substitution that survival after frustration is possible and may even be highly successful. Indeed, it is most often by substitution that the individual becomes adapted to the physical and cultural requirements of his environment.

FOUR CATEGORIES OF HUMAN BEHAVIOUR

From this biosocial and especially medical point of view we can classify all human behaviour into four main forms:

(1) *Adequate, normal, or healthy patterns of behaviour*

If the individual is successful in finding adequate substitutions in his striving for

gratification of his drives, within the framework of behaviour patterns which are required and permissible within the culture in which he is placed, he regards himself as "normal" and he is accepted as such by his fellowmen. In the western culture this so-called normal behaviour is so often substituted that it consists of only few patterns that are still directly connected with innate biological drives. Gathering of food by hunting or fishing, herding of cattle, sowing and reaping are practised by only few in our culture. Fighting for attack or defence, the bodily protection of the young, the conquest and guarding of a life partner, usually take place in strongly substituted forms. Most of our activities like those connected with industrial production, commerce and transportation, housekeeping, nursing, teaching, all scientific and artistic "cultural" activities, the keeping of law and order, etc., bear hardly any resemblance to the original drives which they serve to substitute. Even so, the majority of individuals in such a strongly domesticated culture succeeds in finding more or less harmonious (even if not complete) satisfaction along these culturally sanctioned pathways. These individuals enjoy bodily and mental health. They stay out of the hands of police and judges, and they do not need doctors. In cases of conflict they normally find support with their parents, life partners, friends, etc. In the western culture, work, games, so-called "cultural activities," and the giving of love and sympathy to fellow beings, are the main substituted activities which are considered normal and as such are encouraged and rewarded.

(2) *Psychopathic sociopathic patterns of abnormal behaviour*

If the behaviour patterns along which the individual acts out his "innate" tendencies, either directly or in substituted forms, bring him into conflict with the culturally accepted norms of the group to which he belongs, his behaviour is medically called *psychopathic*. Such psychopathic behaviour includes, for example, all forms of delinquency, alcoholism and other addictions, prostitution and other sexual abnormalities. Psychopathic behaviour brings the individual in conflict with the key figures in his personal environment and, very often, sooner or later also with police, judge, or social workers. The attitude of society towards these psychopathic patterns is usually one of accusation; the individual is condemned, punished, or ostracized; he is usually not regarded as a bodily or mentally sick person.

It should be stressed that this definition of psychopathic behaviour is an example of a medical diagnosis based on a social symptomatology, and in which a social yardstick, not a biological or somatic one, is used to define what is normal. Indeed, several forms of behaviour which are called psychopathic in one culture may be perfectly normal in another community. Polygamy, for instance, or sexual intercourse at the time of puberty, are generally regarded as signs of psychopathic behaviour in the western culture; in some eastern countries, however, they are perfectly normal and even respectable ways of life. The same holds for addiction. A certain indulgence in alcohol is part of the regular "normal" behaviour in the western culture; but the use of cocaine is universally condemned as abnormal. Yet in come parts of South America the reverse is true, and in the Mohamedan world the use of alcohol is a sin which would bring the individual into serious conflict with his society.

It is also clear from our definition that psychopathic behaviour need not necessarily be an inborn error of conduct. It is only the social symptomatology on one hand and the social criteria of what the cultural group considers as normal on the other hand,

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which distinguishes the psychopathic from other forms of behaviour. The term psychopath could therefore with profit be exchanged for *sociopath*.

Most so-called psychopaths are bodily healthy, sometimes to a surprising degree, unless their psychopathic activities produce secondary damage, e.g. when excessive aggressive behaviour leads to accidents or injuries, when syphilis is acquired during promiscuity, when cirrhosis of the liver or encephalopathy follow alcoholism, or when carcinoma of the lung or diseases of the peripheral and coronary arteries are promoted by a "psychopathic" addiction to cigarette smoking. But these are secondary effects, so remote at first sight that many doctors will be surprised or reluctant to admit their sociopsychogenic roots.

(3) *Psychoneurotic patterns of abnormal behaviour*

If the individual remains within the framework of behaviour which the cultural norms of his group require and permit, but does not succeed in finding gratification for his drives along these pathways, the result may be a disturbance of his emotional harmony.

This *insufficient harmony*, better called internal conflict, between innate or developed drives and the potency to find gratification for them within the physical and cultural possibilities for action and substitution, which the environment allows the individual, we propose to call *neurosis*. (It is clear that this definition of neurosis contains both a biological and a social criterion.) The individual may react to this for him frustrating situation by a behaviour which betrays his inner conflicts and which is then diagnosed under different classifications, e.g. as neurotic hypersensitivity, anxiety neurosis, compulsive neurosis, phobia, neurotic dependency, neurotically impaired adaptation to changing circumstances, egocentricity, suggestibility, or by showing some forms of "neurotic" infantile conduct like weeping, complaining, gossiping, and the demand for more care and attention than corresponds to his age and social position. These are forms of *psychoneurotic behaviour*. They may, sometimes even seriously, affect the interhuman relations of the individual with those who live or work together with him, but as a rule they do not bring him into a major conflict with society in general. In those with whom these individuals have to live or work, their behaviour usually produces feelings of irritation or ridicule, sometimes aggression, sometimes interest or sympathy, often mixed with a certain disdain. In the western culture, psychoneurotic behaviour patterns are being more and more regarded as a form of mental illness. In other cultures this is usually not the case, especially if the psychoneurosis is not recognized as a substituted form of behaviour to frustration. In addition to parents, marriage partners, etc., in the western culture at least, doctors, psychiatrists, and psychiatric social workers serve as key figures for support.

In this concept there is no fundamental aetiological difference between psychoneurotic and psychopathic (sociopathic) behaviour, although their symptomatologies are widely different in social forms and consequences. Both are abnormal patterns of behaviour as reactions to frustration, but one is acted out in a way which brings the individual in external conflict with society, the other in internal conflict with himself. Neurotic and psychopathic behaviour may occur in the same individual, alternating with normal behaviour patterns, depending on the different life situations. Rather than label an *individual* as a psychopath or neurotic, we would therefore prefer to speak of psychopathic (sociopathic) or neurotic behaviour patterns as types of reaction to frustration.

Psychotic in this scheme we would call reaction patterns that belong both to the sociopathic and to the psychoneurotic type, occurring in individuals with a damaged central nervous system and thereby showing a behaviour which is so disturbed that it produces in the environment, and even in the doctor, the attitude that the individual should be separated from society. For this definition it is irrelevant whether the damage to the central nervous system, responsible for the grossly abnormal behaviour, is produced by atherosclerotic ischaemia, by acute anoxia, by syphilitic lesions, by a brain tumour, by drugs, or an enzymatic disturbance such as we suppose to be present in schizophrenia. The main advantage of this pragmatic definition is that it does not make *fundamental* distinction between psychopathic, psychoneurotic, or psychotic behaviour and that it clearly indicates that next to medical and biological criteria a social yardstick is used to label certain behaviour patterns as psychotic. In fact, next to the typical cases where the classification of "psychosis" gives no difficulty, there is a very large number of patients where the psychiatrists hesitate or disagree whether to describe this behaviour as psychotic or severely neurotic. The concept that all these behaviour patterns can best be understood as abnormal reactions to frustrations and that the social conditioning of the psychiatrists in their own culture is also responsible for their gauging of abnormality, makes it easier to understand these difficulties of classification.

(4) *Psychosomatic patterns of abnormal behaviour (i.e. psychogenic bodily disease)*

At first sight it may seem unusual to classify bodily disease under behaviour. We are so accustomed to apply the term behaviour to the visible neuromuscular activity and movements of the individual, that we find it hard to apply the term, for example, to movements inside the body caused by smooth muscle, such as peristaltic activity, or to changes in heart-rate. We are accustomed to classify weeping under behaviour, but find it difficult to apply this term to the secretion of tears. Yet if one studies the behaviour of the intact animal organism as a whole, it becomes obvious that reactions hardly ever take place in the neuromuscular system only, separated from simultaneous activity in the visceral organs or in the endocrine glands such as the adrenal medulla and cortex. If one is willing to accept the view that nature does not make a distinction into behaviour between the more or less voluntary movements and bodily changes, and the more or less involuntary movements inside the organism, but that every change in the homeostasis of the individual can be regarded and studied as behaviour, whether it be visible from the outside or inside, then the classification of psychosomatic disturbances becomes much more easily understandable as natural phenomena.

We then propose to regard as psychosomatic abnormal behaviour (or, in other terms, psychogenic bodily disease), certain reaction patterns to frustration that occur when the individual conforms to the cultural norms of the society to which he belongs, but, like the neurotic, is unable to find gratification along these required and permitted pathways, and when such an individual also rejects psychoneurotic behaviour patterns (manifest hypersensitivity, anxiety, phobias, egocentricity), controls weeping or complaining, does not openly demand special care, and consciously or (and) subconsciously tries to avoid or control the outlet of his emotions along neuromuscular pathways. Such an individual does not behave by psychopathic discharges of behaviour, or only in special situations, such as, for example, during a psychiatric interview. Neither does he act out his emotional disharmony by psychoneurotic

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behaviour, or only by outbursts in special situations. Only on careful observation does he appear *tense*, by which we understand a situation of inhibited (usually neurotic) activity. We hypothesize that when psychopathic or psychoneurotic reaction patterns to frustration are thus inhibited from discharge, *somatic* reaction patterns are substituted in an increased intensity and duration, so that they are called diseased, and thus bring the individual to the family doctor or the specialist.

Although psychosomatic disorders are in this concept of a similar origin as psychopathic or psychoneurotic behaviour patterns, it is often difficult to recognize them as substituted reactions to frustration. Moreover, they affect human relations in an entirely different way, and this explains why the environment, at least in our culture, reacts to the different forms of behaviour patterns so differently. The public reacts to psychopathic behaviour with moral indignation, to psychoneurotic patterns with irritation, amusement, or disdainful pity, to a somatic symptomatology with sincere sympathy and care. This is exemplified by the changing behaviour which some doctors display towards their patients, e.g. those with ulcerative colitis or asthma, when they become aware of the neurotic background of these diseases and from then on are unable to give them the same unmixed attention; I need not tell you with what disastrous results.

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Although our knowledge of the psychosomatic reaction patterns is still grossly insufficient, enough material has now been brought together to regard diseases like ulcerative colitis, peptic ulcer, bronchial asthma, and essential hypertension as particularly belonging to this aetiological category, together with "functional" disorders like migraine, extrasystoles, habitual constipation, dysmenorrhoea, or sexual impotence. In other words, this aetiological hypothesis cuts right across those distinctions that make the "either organic or functional" the basis of their classification. Whatever the merits of such a classification may be for practical purposes (which we certainly will not deny), from an etiological point of view such a distinction seems untenable; indeed, it is by this identification of "functional" with psychogenic and "organic" with somatogenic that the development of a comprehensive system of medical thinking has been retarded.

BEHAVIOUR CHOICE

After having given psychosomatic reaction patterns a place as a form of human behaviour in health and disease, the next question that arises concerns the mechanism of "pattern choice." Why do some individuals react by normal patterns and remain bodily and mentally more or less healthy, whereas others in comparable situations "choose" a form of abnormal behaviour and as a result react by, or suffer from, one of various forms of psychopathic, psychoneurotic, or psychosomatic disturbances?

As far as present knowledge goes, it seems as if an interaction of several factors, partly in the individual (innate, developmental, and acquired), partly in his environment (parental, marital, occupational) are involved. Our own researches into the life histories of healthy individuals certainly did not reveal that these people had not met with frustrating situations, either in their youth or later in life. But their behaviour in similar frustrating situations differed from that of our patients. These normal individuals seemed less sensitive, less predisposed to react with standardized patterns to which they were once conditioned. They seemed to find it easier to act by a form of

substituted behaviour, which appeared to be the best adapted to the frustrating situation. We are beginning to suspect that certain inborn properties of their central nervous system make "normal" individuals less sensitive and less compulsively conditioned, so that the emotional impact of what to others is a severe frustration is less intense; it also seems as if they have more possibilities to find along the forms of gratification substitutive behaviour which the environment requires and permits in a given situation. In other words, they seem to adapt themselves more easily. The present knowledge of neurobiochemistry does not allow a concept of the chemical basis of the hypersensitivity and tendency to rigid conditioning, which seems to predispose some individuals to psychoneurotic, psychopathic, or psychosomatic behaviour But the fact that one can change the sensitivity and reactivity of an individual by drugs, of which we are beginning to understand and localize the mechanism of action in the central nervous system, may clear up this lack in our knowledge in the near future. It has been found that some individuals are more easily conditioned to certain reaction patterns than others. Once conditioned, it must be more difficult for such an individual to avoid unrewarding behaviour and substitute it by better adapted patterns. An investigation into the rate of conditioning in psychoneurotic, psychopathic, and psychosomatic patients, compared to normal individuals, might reveal whether we are right in assuming a connection between this neurophysiological phenomenon and a predisposition towards the above-named forms of disturbed behaviour.

The *environment* is also important in determining behaviour choice. If an individual by his inborn tendencies, imprinting, and early conditioning is more inclined, for instance, towards aggressive or dominant behaviour, it is obvious that within a culture or during a cultural period where aggressive, dominating behaviour is acquired and appreciated, as in an army at war or in an aggressive business world or political situation, such an individual might be successful and his behaviour "healthy," whereas in a different, less competitive, more complacent environment a similar behaviour is considered abnormal and might bring the individual into conflict either with others or with himself, which would label him now as a psychopath or a psychoneurotic, or which could make him bodily ill.

The "choice" of behaviour in a given situation is made by the individual partly consciously, partly subconsciously (to deal with the distinction between these two from the biological point of view would lead us too far), partly involuntarily (which, from the biological point of view, is a preferable way of expressing, if not the same, then a very closely related mechanism). In any case, the "choice" is sometimes almost like a reflex, when the individual by heredity and earlier experiences is highly conditioned and disposes of only a limited number of freedoms in his possible responses, whereas in other individuals or in other situations, the number of the freedoms of choice is much greater. This depends, *inter alia*, on the stability with which certain experiences in early youth (like imprinting) have established themselves in the organization of the individual, on the regularity and rigidity with which the cultural behaviour patterns ("norms") of the parents and the group have been rewarded and other patterns have been punished during the individual's development, or if he has been submitted to controversial behaviour and influences or to neglect, so that these patterns have become only loosely incorporated in his personal behaviour structure. In later stages of development, identification, aspiration for reward, fear of punishment, conscious insight, or foresight of consequences, together with the incorporated norms (described

by some psychiatrists as Super Ego or Ego Ideal) are all operative factors in determining which substituted form of behaviour appears in a given situation. In general, however, the result can still be understood as an interaction of the biological and social forces and experiences, incorporated in the individual as inherited, or acquired behaviour patterns, with the possibilities offered by his environmental situations.

A NEUROPHYSIOLOGICAL CONCEPT OF PSYCHOSOMATIC REACTION PATTERNS

Physiologically speaking, we can understand substitution by starting out from the concept that in principle the organism always reacts as a whole. Information from the environment reaching the central nervous system through the sense organs will provoke certain reactions there, depending on previous information and "disposition." As all parts of the central nervous system are interconnected, we may assume that, generally speaking, the output from the central nervous system can irradiate diffusely to all innervated organs, as is the case in primitive central nervous organizations. In more highly organized species this diffuse output, although in principle still possible, is soon directed, however, by a certain preference of the discharges for certain effector areas. Learning and conditioning, like other forms of facilitation, are the processes which, during the ontogeny and development of the individual, make a highly variable degree of specialized output possible, whereby some originally concomitant discharges are inhibited and others facilitated. In principle, however, every output from the central nervous system still takes place in the form of multiple discharges into the whole of the organism, of which some, however, predominate as the situation requires. These complex reaction patterns are therefore fundamentally inseparable. They can be classified for the purpose of understanding the problem of pattern choice as follows:

(a) Neuromuscular activity like food-seeking, hunting, running, fighting, fleeing, working, or sexual activities. These movements aim directly towards achieving certain goals either nutritive, aggressive, defensive, or in other ways consummatory; simultaneously they furnish the drives and outlet in bodily activity.

(b) Mimical expressions, as already studied and described by DARWIN.

(c) Vocal expressions, which in animals already allow of certain specific discharges, to which the other members of the group also react specifically. In the human, vocalization has developed into verbalization and, as a result, can take place in immensely varied forms.

Both mimic and vocalization are of great biological usefulness, e.g. for finding, calling for help or warning the other members of the group, or for the frightening away of an opponent. In addition, they also serve the purpose that the central nervous activity is discharged into bodily actions of the individual. Vocalization and mimic therefore play an important part in giving substituted gratification where a consummatory act is impossible.

These neuromuscular patterns (a), (b), and (c) take place through feedback circuits from the central nervous system via myelinated nerve fibres to the striated voluntary muscles, and back. In addition, every activity of the organism is accompanied by:

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(d) Changes in the visceral organs, innervated by the feedback system of the autonomic nervous system, consisting in contraction of smooth muscle, secretion of glands, and changes in the function of the heart and vessels.

(e) Changes, also originating from the central nervous system, which either directly or indirectly affect the production or secretion of hormones.

Normally these five reaction patterns irradiate from the central nervous system as one harmonious complex, a functional unity. But during his development and adaptation to his environment, man learns to regulate especially his mimic, vocal, and neuromuscular discharge patterns. He learns to direct, to postpone, and above all to inhibit them. The tremendous development of the cerebral connections has greatly enhanced the possibility of isolating, damping, and inhibiting discharges. These mechanisms come into action under the influence of imprinting, early conditioning to and learning of incorporated norms, and conscious insight, as described above.

A constant result of our studies of patients with psychosomatic disorders has been the finding that these individuals, although inclined towards discharge of a psychopathic or psychoneurotic pattern, *inhibit* this activity along mimical, vocal, or neuromuscular pathways to a high degree. Either because the emotion produced by frustration does not even penetrate into consciousness or because the incorporated norms or the actual environmental situation do not allow a psychopathic discharge, they do not act out; neither did they react by frank psychoneurotic patterns.

Upon these findings we formulated the hypothesis that when the discharges sub (a), (b), and (c) are inhibited, only the pathways via (d), the autonomic nervous system, or (e), the endocrine system, are left; apparently this partial inhibition disturbs the natural harmonious complex discharge and reinforces substitution along pathways which otherwise would carry only a minor output. What normally would have been a "concomitant" effect in the visceral system of limited duration and intensity, within the limits of the physiological range, now becomes an abnormally intense and (or) prolonged reaction which is thus productive of disease. This state of affairs is, for instance, most evident in patients with essential hypertension, who have been found to be at the same time hypersensitive and aggressive and yet inhibited in their aggressive discharges. A normal individual shows, when in an aggressive disposition, "normally" a slight and passing rise in arterial tension; in these patients, however, the inhibition of normal or excessive mimic, vocal, and neuromuscular activity produces an abnormally strong and prolonged substitution of the reaction into the cardiovascular system. Once conditioned to this type of response (and our hypertensive patients are all of the compulsive, rigidly conditioned type), new frustrations reinforce this reaction pattern by the mechanism of facilitation.

Similar substitution patterns have been described especially by HAROLD WOLFF and his co-workers, and by ourselves, to be operative in the production of peptic ulcer, asthma, ulcerative colitis, rheumatoid arthritis, and hyperthyroidism. These diseases were found to occur in individuals who showed in different forms and varieties a combination of hypersensitivity to frustration on one hand, and a strong tendency to react by psychopathic or psychoneurotic behaviour with inhibition of these forms of instinctive or substituted neuromuscular discharges on the other hand. This inhibition therefore seems to be an essential factor in the neurophysiological mechanism underlying the "choice" of psychosomatic behaviour.

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THE ESSENCE OF THE BIOSOCIAL CONCEPT

The cause of this inhibition of neuromuscular activity in our patients appeared to be a partly conscious, partly subconscious rejection of certain substituted behaviour patterns like outbursts of temper, shouting or fighting, alcoholic excesses, staying away from work, or promiscuity, by their incorporated norms forbidding these forms of "psychopathic" behaviour. They also rejected weeping, hysterical manifestations, or the verbal expression of anxiety and insecurity which would have brought them along psychoneurotic patterns some form of substituted gratification. In many cases our western education, which is more and more directed towards self-control, restrained "gentlemanly" or "ladylike" behaviour, and in which outbursts of temper or grief are suppressed as uncivilized, which in other words forbids both psychopathic and psychoneurotic behaviour, had "overconditioned" these individuals so much that in a situation of frustration they could not act out either by healthy, psychopath, or psychoneurotic patterns. Thus, our modern culture, which is getting more and more complicated and in itself contradictory, so that more and more individuals are frustrated in acting out their innate behaviour patterns, by embracing in its rigid education and domestication an ever-widening number of individuals, limits these individuals at the same time in their possibilities of acting out along patterns that are forbidden as psychopathic or psychoneurotic. Thus the "shift" into psychosomatic patterns becomes understandable not only as an individual solution and a biological necessity, but also as a social phenomenon. The occurrence of these diseases is a manifestation of a general law: civilized man in his tendencies towards self-development and gratification is frustrated, more than by his dead environment, by his fellow men. But his fellow men create at the same time the limitations of the patterns within which he is required and allowed to act out his reactions to these interhuman frustrations. The control of neuromuscular discharges which western man must master to live adequately in this culture is, at least for individuals, both an educative and a potentially pathogenic factor, leading to the appearance of psychosomatic disease. This insight into the social root of disease, for long recognized in the aetiology of the various forms of mental illness, now appears to be also responsible for the psychosomatic disturbances. It is for this reason that psychosomatic research has united, among its workers, medical investigators with biologists, psychologists, and sociologists. It should give us all, so it seems, enough impulses for a combined form of *healthy* substituted behaviour.

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SUMMARY

Psychosomatic research is hampered by dualistic thinking. This difficulty can be overcome by the realization that the understanding of man is possible *either* by studying him as a biosocial unit by exact scientific methods *or* as a unique totality, to be approached by introspection and phenomenological communication. For the medical investigator the first method appears the most fruitful. Once the choice between these two ways of approach is made, there should be no deviation from the methods, concepts, and terminologies, which have proved themselves fruitful within a scientific frame of reference.

The author proposes to regard and study psychosomatic disorders as patterns of human behaviour, acted out via the cerebrospinal or autonomic nervous or endocrine systems, as a reaction to interhuman frustration. As such, psychosomatic diseases have a similar aetiology as sociopathic or neuropathic (neurotic or psychotic)

behaviour patterns from which they differ, however, in symptomatology and biological and social consequences. Inhibitions enforced on the social behaviour of the individuals by cultural patterns may block sociopathic or neuropathic discharges and thereby favour the occurrence of psychosomatic syndromes.

It is suggested that psychosomatic syndromes represent a substitution of other activities and thus belong in the same category of phenomena as for example displacement in animal behaviour.

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CONDITIONING AS A CAUSE OF ASTHMATIC ATTACKS

A LABORATORY STUDY*

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INTRODUCTION

A NUMBER of authors have written on the role which conditioning may play as a cause of attacks of asthma. Their evidence, however, was mostly indirect, mainly based on clinical histories as obtained from the patients. Some of our former observations on asthmatic attacks provoked by emotional stimuli under controlled laboratory conditions (DEKKER and GROEN, 1956) also seemed in line with a conditioning mechanism although they did not represent classical examples of such a mechanism.

Strictly speaking, a conditioned attack of asthma should contain the following elements:

1. One or more attacks of asthmatic dyspnoea.
2. A conditioning stimulus or situation, which originally does not in itself produce an attack but coincides with these attacks.
3. The occurrence of attacks after exposure to the conditioned stimulus or the conditioned situation alone.

In this paper, observations on two patients are presented which seem to fulfil these requirements. In both patients the conditioning took place under experimental conditions in the laboratory and the effect could be measured by the standard technique used in the former investigation (DEKKER and GROEN, 1956).

METHODS

The experiments were carried out in the course of investigations during which patients were exposed to allergic and emotional stimuli. To register the effect, we used a modification of the method developed by HERXHEIMER (1951a and b) and TEN CATE and ORIE (1953, 1954) for the detection of inhalation allergy by provocation tests. In this method the vital capacity is used as the parameter. The patient is seated in front of a spirograph. Every 4 min the vital capacity is determined; between these determinations, the patient is not connected to any apparatus. After the vital capacity has been registered a number of times and a baseline value has been obtained, the patients are exposed to various stimuli. During the experiment the determination of the vital capacity is continued every 4 min for at least 20 min, as far as the condition of the patient allows.

For the present investigation into the possibility of the production of asthmatic attacks by conditioning under laboratory conditions, an unconditioned stimulus was provided by the inhalation of nebulized allergens to which the patients were hypersensitive.

An aerosol‡ of grass-pollen extract (5000 Noon units per ml) was administered to the first patient; the second patient inhaled an aerosol of a 5% solution of house-dust extract as prepared in the University of Groningen (TEN CATE, 1954).

The allergens were nebulized in glass atomizers§ by means of a stream of oxygen with a flow-rate of 4 l./min. The atomizers were placed, hidden from the patient's view, in a wooden box. The box

* From the Second Medical Service of the Wilhelmina-Gasthuis, Amsterdam, the Netherlands.

† Supported by grants from the Rockefeller Foundation and the Health Organization of the Netherlands Foundation for Applied Scientific Research.

‡ Trade mark: LIFA, Groningen.

§ Trade mark: Wiesbadener Doppelinhalator.

contained a number of holes through which rubber tubing carried the aerosol to the patient. The tubes from any atomizer could be made to leave the box through any hole; this prevented the patient from knowing what substance he or she was given to inhale. The inhalation took place by means of an exchangeable glass-tube mouthpiece, held loosely between the half-opened lips through which the patient was quietly breathing outside air.

A regularly progressive decrease of the vital capacity of more than 10% of the mean of the baseline values was accepted as a positive reaction, according to the standards laid down by TEN CATE and ORIE (1953, 1954).

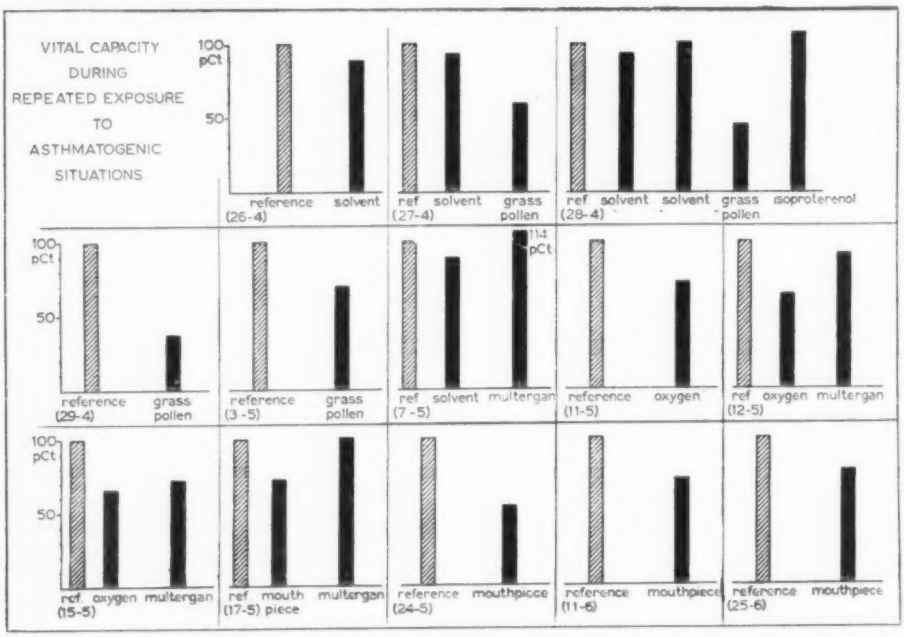

FIG. 1 (Patient *A*).— Diagram of vital capacity measurements. The mean values of the baseline determinations, indicated by the shaded areas, are the reference level, put at 100%. The black areas indicate the means of the vital capacities after each test, expressed in percentages of the corresponding reference values.

The figures give the mean value for all the determinations of the vital capacity during a 20-min observation after the end of the provocation or, in other instances, up to the moment when an attack had to be stopped by drugs. The effect of drugs has been indicated as the maximal increase in the vital capacity which was observed.

After one or more positive reactions to the inhalation, we gradually changed the inhalation situation and studied the influence of these changes on the effect. These "fragments" of the inhalation situation acted as conditioned stimuli. Registration and evaluation of these reactions took place in the same manner as those of the allergic reactions. This determined the sequence of the experiments described below.

OBSERVATIONS

Case 1. *A.* A 37-year-old unmarried housekeeper suffered from serious bronchial asthma. Skin reactions to grass pollen and tree pollen were strongly positive.

26 April: First control inhalation test with the neutral solvent of the allergen extracts,* caused a slight subjective dyspnoea and a decrease of the vital capacity to a mean of −11% (Fig. 1). The patient showed manifest anxiety for the examination. After reassurance the vital capacity increased to −4%.

* Coca solution: A watery solution of sodium chloride, sodium bicarbonate with a trace of phenol.

27 April: A second inhalation of an aerosol of the neutral solvent caused no dyspnoea and no decrease in vital capacity. The inhalation of a solution of grass-pollen extract, however, had to be stopped after 6 min, because of an attack of asthma during which the vital capacity decreased to a mean of −40%. The attack was stopped by administration of an aerosol of isoprenaline.

28 April: The experiment was repeated in exactly the same way. The investigator took care to use exactly the same words for his instructions to the patient. Inhalation of the neutral solvent caused no reaction. From the same opening in the atomizer box from which the patient had received the pollen aerosol on 27 April, the neutral solvent was administered for a second time; again there was no reaction. Inhalation of a grass-pollen aerosol, however, once more caused an impressive attack of asthma with a mean decrease of the vital capacity to −54%; inhalation of isoprenaline stopped this attack within a few minutes.

To test the possibility that the patient believed that the first solution she was given to inhale was always innocuous, she was made to inhale a grass-pollen extract without preliminary control on 29 April and 3 May. Each of these inhalations was followed by a clear-cut attack of asthma.

This convinced us that the positive reactions to the inhalation of grass-pollen extract could not be ascribed to emotional factors; the patient obviously met the criteria of TEN CATE and ORIE for the presence of a manifest inhalation allergy to grass pollen.

On 7 May another inhalation test with the neutral solvent was carried out. To our amazement, the patient reacted this time with subjective and objective dyspnoea and wheezing during the inhalation. The vital capacity dropped to −11% after 10 min inhalation.

Several explanations for this phenomenon seemed possible: fatigue caused by the repeated measurements of the vital capacity, an allergic reaction to minute amounts of allergen in the apparatus, or a reaction to psychological influences.

The dyspnoea and wheezing had begun already during the inhalation. This made fatigue seem improbable. Moreover, a series of vital capacity determinations during 60 min, without preceding inhalation, caused no decrease of the vital capacity, so that this possibility seemed excluded.

The possibility of an allergic influence was next studied by a series of control experiments. To rule out the presence of an allergen in the solvent, a stream of oxygen was administered through an empty new atomizer. This caused a typical attack of asthma with a decrease of vital capacity to −27%. The attack disappeared 20 min after the intramuscular injection of thiazinamine.*

To exclude contamination of the rubber tubing by traces of allergen as the cause of these attacks, new rubber tubes were built into the apparatus. Oxygen inhalation through these tubes on the 12 May caused another attack. In view of the possibility that the patient might have become sensitive to substances in the rubber, plastic tubing was used. The glass mouthpieces were exchanged for new ones. All these measures did not prevent the patient from developing an impressive attack of asthma on the inhalation of oxygen through this new material. The vital capacity decreased to a mean value of 34%.

Next, the presence of allergens in the oxygen had to be excluded. On 17 May with this purpose, the patient was placed before the atomizer box as usual. After the base-line determinations, the nose clip was applied and the glass mouthpiece given between the lips. The patient herself remarked that the mouthpiece was not connected to the tubing and the atomizer. The investigator replied that this was not necessary. Within 5 min, after inhaling ordinary room air through and past the glass mouthpiece, she developed an attack of asthma which gradually increased in severity; the vital capacity decreased to a mean of −27%. Obviously the patient had now reached a state where it was possible to provoke an attack of asthma within a few minutes by simply asking her to hold a piece of glass tube in her mouth.

Our last, admittedly somewhat far-fetched, allergic hypotheses were that some substance in the laboratory or on the body of the observer might be responsible for the phenomenon.

With this in mind the experiment was repeated on 24 May in the ward, where the patient at that period had no "spontaneous" attacks. A severe attack was produced by putting the glass tube in her mouth for a few minutes; the vital capacity fell to a mean of −46%.

A different investigator was asked to perform the next experiments. He abandoned the use of the nose-clip and provoked clear-cut asthmatic attacks on different occasions on 11 June and 25 June by the simple introduction of the mouthpiece alone. All these attacks could be stopped by the

* Trade mark: Multergan.

injection of thiazinamine. Representative curves from this series of observations are reproduced in Fig. 2.

Case 2. *B.* A 37-year-old female shop assistant, suffered from severe bronchial asthma. Skin tests for house dust and tree pollen were positive.

A similar series of observations as in the first case were done in this patient (Fig. 3).

1 September: the investigation for inhalation allergy was started. Adminstration of an aerosol of the "neutral" solvent gave a mean decrease of the vital capacity to −9%. Inhalation of a mist of tree-pollen extract of 25·000 Noon units per ml caused an irregular decrease of the vital capacity of an average of 12%. The inhalation of house-dust extract, however, was followed within 4 min by a

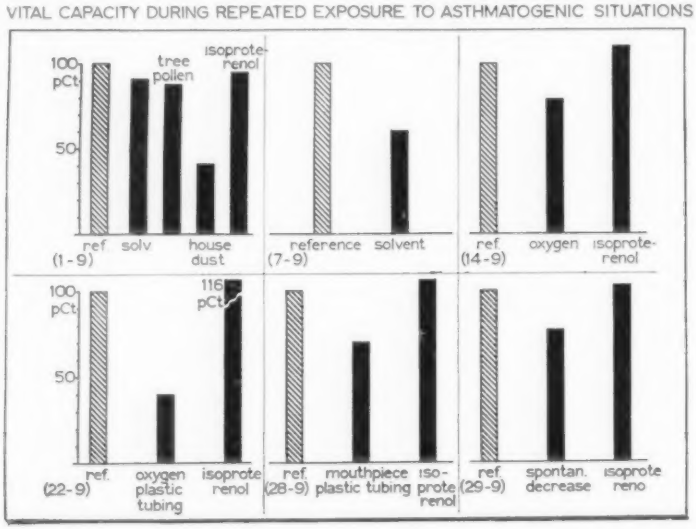

FIG. 3 (Patient *B*).—Explanation in legend, Fig. 1.

severe asthmatic attack and a decrease of the vital capacity to −59%. The attack was suppressed by inhalation of isoprenaline.

This strongly positive reaction made a manifest inhalation allergy to house-dust extract highly probable. Its existence was confirmed in a series of later investigations not included in this paper, which regularly gave positive reactions to the allergen extract.

During the next investigation on 7 September the control inhalation of the neutral solvent was also followed by a clear-cut attack of asthma and a decrease of the vital capacity to a mean of −40%. This made us interrupt the further investigation of the inhalation allergy and begin a series of investigations into the cause of the asthmatic attacks following the inhalation of the indifferent solvent.

On 14 September the patient inhaled oxygen instead of an aerosol. It caused a slight subjective and objective dyspnoea. The vital capacity decreased by a mean of 20%. A detail worth mentioning was that during this dyspoea the patient's nose secreted a watery fluid, as had happened during many of her "spontaneous" attacks. Oxygen, administered through plastic tubes, caused a similar decrease in vital capacity the next day. On 22 September inhalation of oxygen through plastic tubing caused another attack, this time even more severe. There was typical wheezing and the vital capacity dropped to a mean of −60%. When the tubes were disconnected from the oxygen supply, she still reacted to the introduction of the mouthpiece with the plastic tubes attached, by a decrease of the vital capacity of 30%.

On 29 September the vital capacity dropped 23% of the mean of the first three determinations when the patient was simply seated in front of the atomizer-box without any inhalation or imitation thereof.

It must be pointed out, however, that this patient was less suitable as a subject for this kind of

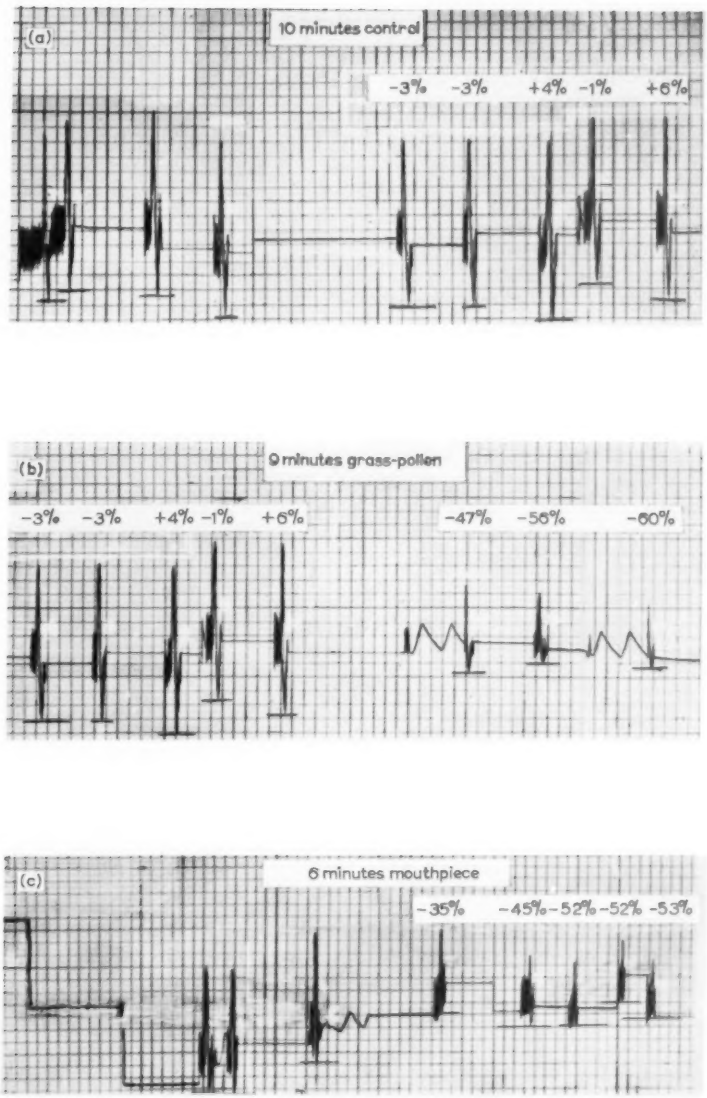

FIG. 2 (Patient *A*).—Spirographic records of the reactions of the vital capacity of patient *A*.
(a) To the inhalation of the neutral solvent.
(b) To the inhalation of grass-pollen extract.
(c) To the introduction of the glass mouthpiece after conditioning. (The bottom figure is reproduced on a more reduced scale than the other two.)

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examination than patient *A*. During the baseline period the variation of her vital-capacity determinations often somewhat exceeded the 10% limit. In addition she was the habitual user of a hand-spray apparatus with the proprietary preparation "respifral." The possibility that the asthmatic breathing and the reduction of the vital capacity might result from the wearing off of the pharmacological activity of the drug could not be definitely excluded. However, the change in vital capacity and the onset of asthmatic attacks followed so regularly after the inhalation situation, and this could be repeated so often, that the assumption of a causal relation seemed convincing to two observers and to the patient.

SUMMARY OF FIRST SERIES OF OBSERVATIONS

These concerned two asthmatic patients, who had positive skin reactions to grass pollen and house dust respectively and who reacted by typical attacks of asthma when they were given these allergens to inhale in the laboratory. The inhalation of the neutral solvent of the allergen extracts initially caused no reaction.

In the course of further inhalation experiments, however, the reaction patterns of the patients changed. They began to react also to the inhalation of the indifferent solvent with attacks of dyspnoea. Later it was found that the inhalation of pure oxygen in the laboratory caused attacks of asthma, and finally it was sufficient to introduce the mouthpiece of the apparatus or to imitate a connection of the mouthpiece with the inhalation apparatus, to provoke severe paroxysms of asthma. These attacks, once developed, could not be distinguished from those which appeared after inhalation of allergens or from spontaneous attacks: more specifically they reacted favourably to inhalation of isoprenaline or injection of Multergan.

These observations gave the impression that the patients had become conditioned by the allergic attacks to the inhalation situation and later even to certain "fragments" thereof.

In the next series of experiments an attempt was made to cure the patients.

During a number of interviews with patient *A*, her fears for the investigations and her actual life difficulties were discussed. During these interviews the investigator tried to give her support and reassurance. He explained that the introduction of a piece of glass tube could not possibly be harmful. After a number of interviews he gave her the mouthpiece to hold between her lips for a few seconds only. This gave no reaction. Under constant reassurance the time during which the patient held the mouthpiece between the lips was gradually increased. However, when an exposure time of 4 min had been reached, the patient got a severe attack of asthma which had to be stopped by isoprenaline.

This attempt at deconditioning by verbal and "personal" influence therefore did not succeed.

In patient *B* the therapeutic effect of a combination of supportive psychotherapy with suggestion was studied. The patient was seen in regular interviews; she also took part in group psychotherapy. In the meantime the inhalations were continued. Preceding each inhalation, the patient was given an intramuscular injection of thiazinamine; in the course of the succeeding investigations the dose of thiazinamine was gradually decreased and finally the drug was substituted with saline. Strict precautions were taken so that the nature of the injections was unknown to the patient. In a third period the preceding injections were altogether omitted.

Table 1 summarizes the effects on the mean vital capacity during the first 20 min after each inhalation under these circumstances. Thiazinamine produced a considerable increase in vital capacity, even in low doses. It also gave considerable protection against the attacks of asthma after the inhalation of oxygen. On 8 October the inhalation of oxygen was tolerated without a preceding injection. There was no decrease of the vital capacity. But on 12 October inhalation of the neutral solvent was followed by a renewed decrease in vital capacity. This effect could be prevented by a preceding injection of thiazinamine, but not by injection of saline.

The inhalations were continued, and on 19 October the decrease in the vital capacity after inhalation of the solvent was 11%, on 21 October it was 10%. On 8 November inhalation of the solvent caused

TABLE 1.—PATIENT *B*

Effect of gradually diminishing doses of thiazinamine followed by saline (O) and omission of the injection (−), on "provocation test" by inhalation of oxygen or neutral solvent. Doubtful deconditioning.

Date	Dose thiazinamine (mg)	Inhalation and time		Mean effect on vital capacity in per cent
5/10/55	25	O_2	10 min	+13
6/10/55	12·5	O_2	10 min	+18
7/10/55	6·25	O_2	10 min	+32
7/10/55	0	O_2	10 min	−22
8/10/55	—	O_2	10 min	+1
12/10/55	—	solvent	10 min	−27
13/10/55	12·5	solvent	10 min	+14
14/10/55	6·25	solvent	10 min	+40
16/10/55	0	solvent	10 min	−27
19/10/55	—	solvent	10 min	−11
20/10/55	50	solvent	10 min	+86
21/10/55	—	solvent	10 min	−10

no decrease any more. At this stage, after a long series of "deconditioning," the patient reacted as she did in the beginning: the inhalation of the neutral solvent did not produce an attack.

In a next series we attempted to desensitize the patient in a similar manner to the inhalation of the house-dust extract (Table 2). Thiazinamine proved to be effective in preventing attacks from the allergen. However, when this premedication was omitted, on 23 November house-dust extract caused a severe attack of asthma, just as it did in the beginning. After the patient had undergone this "unconditioned" attack, two inhalations of the neutral solvent again provoked attacks of asthma

TABLE 2.—PATIENT *B*

Effect of thiazinamine, followed by saline (O) and omission of the injection (−) on effect of provocation-test by inhalation of allergen or neutral solvent. On 8/11 the result indicated the possibility of deconditioning by this procedure: after the severe attack of 23/11 this had disappeared.

Date	Dose thiazinamine (mg)	Inhalation and time		Mean effect on vital capacity in per cent
22/10/55	25	House-dust	10 min	+28
1/11/55	2·5	Solvent	10 min	+76
8/11/55	0	Solvent	10 min	+2
9/11/55	25	House-dust	10 min	−8
23/11/55	—	House-dust	5 min	−51
25/11/55	—	Solvent	5 min	< −12
7/12/55	—	Solvent	10 min	−49
14/12/55	—	Solvent	10 min	−27

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TABLE 3.—PATIENT *B*
Results of inhalation tests demonstrating the disappearance of the conditioning after 11 months.

Date	Inhalation of	Result
9/11/56	Solvent	—
10/11/56	Solvent	—
11/11/56	Solvent	—
12/11/56	Solvent	—

TABLE 4.—PATIENT *B*
Results of consecutive inhalation tests using either various allergen extracts or the neutral solvent. In the beginning of the series some reconditioning appeared to take place, but it was irregular and later disappeared altogether.

Date		Result
12/11/56	Feathers	+
14/11/56	Solvent	—
15/11/56	Solvent	—
16/11/56	Hay dust	+
17/11/56	Solvent	—
18/11/56	Kapok	+
19/11/56	House dust	+
21/11/56	Tree pollen	+
22/11/56	Solvent	+ !
23/11/56	Solvent	—
24/11/56	Kapok	+
25/11/56	Feathers	—
28/11/56	Solvent	+ !
30/11/56	Cat's hair	—
1/12/56	House dust	+ +
6/12/56	Solvent	+ !
7/12/56	Solvent	+ !
8/12/56	Solvent	—
9/12/56	Solvent	—
10/12/56	Solvent	—
10/12/56	House dust	+
12/12/56	House dust	+
13/12/56	House dust	+
14/12/56	House dust	+ +
21/12/56	Solvent	—
22/12/56	Solvent	—
23/12/56	Solvent	—

with decreases in vital capacity of 49% and 27% respectively. Apparently the effects of the deconditioning procedure broke down very easily after the experience of a single severe attack in the inhalation situation.

At this moment the inhalation experiments were interrupted.

The patient was re-examined eleven months later. In the meantime she had been treated by occasional individual and regular group psychotherapy. An obvious change in her personality and behaviour towards doctors and fellow patients had taken place in the meantime. She still was rather timid and easily disturbed, but she was far different from the withdrawn, extremely sensitive, and overtly fearful person she had been at the time of the previous investigation. Inhalation of the neutral solvent produced no reaction (Table 3); inhalation of house dust still caused attacks. A series of inhalations of gradually increasing doses of house-dust extract was now given in an attempt to desensitize her against this allergen (Table 4). To these inhalations she reacted by attacks of widely varying severity. The impression was obtained that this depended not only on the dose or duration of the inhalation, but also on the emotional attitude of the patient as a result of the life situation she happened to be in at that very moment. From time to time, an inhalation of neutral solvent was given between the inhalations of the allergen extract. It was found now that although she had a great number of "unconditioned" attacks, a positive reaction to the inhalation of the solvent occurred only on rare occasions. Apparently the "preparedness" of the patient to become conditioned by the experience of attacks in the laboratory situation, had become much less. It was surmised that this change in "conditioning behaviour" was related to her changed attitude to the doctors and the laboratory situation in general, but this could not be proven.

DISCUSSION

In these two patients the occurrence of asthmatic attacks was observed under similar circumstances as in conditioned responses developed in certain animal experiments. Both patients were simultaneously exposed to an inhaled allergen and a certain situation (observer, laboratory room, apparatus, tubes, mouthpiece, etc.). After one or more exposures, the experimental situation (or a part of it) alone, provoked an attack. It seems justified to regard this newly formed way of production of asthmatic attacks, as changes in behaviour patterns, developed as a consequence of a conditioning process.

Several investigators in the literature have mentioned the possibility of conditioning as a cause of attacks of asthma, and case histories have been reported that even seem to point to a conditioning mechanism as a frequent cause of attacks. We have been unable, however, to find any report where the development of such a conditioning has been studied and demonstrated under laboratory conditions.

Between 1927 and 1930 HANSEN (1927, 1930) drew attention to the possibility of conditioning superimposed upon unconditioned allergic attacks of asthma. Both he and VAUGHAN (1939) cite as an illustration the story, endlessly repeated in this literature, of the lady who, being hypersensitive to roses, developed an attack of asthma when she was shown a paper rose. This lady even found her way into textbooks of internal medicine (VAN DEN BERGH *et al.*, 1941). According to URBACH and GOTTLIEB's textbook of allergy (1946), attacks of asthma caused by a conditioned reflex mechanism occur in many cases. But no evidence for this thesis is presented. KALLOS (1950) mentions the occurrence of asthmatic attacks as a conditioned reflex, following the experience of attacks, for example, after exposure to pollens. He gave no arguments for this contention. HERXHEIMER (1951) also considers the possible significance of conditioning as the mechanism of psychogenic attacks of asthma, but without contributing factual material. KREMER (1953) described patients who, after having experienced asthmatic attacks due to dust from their beds, later got an attack as

soon as they entered their bedroom and saw their beds. He regarded this as a conditioned reflex. GROEN (1950) described a patient with attacks of asthma due to contact with horses. This patient also got a feeling of oppression on seeing horses from the window of the train. Many other of GROEN's case histories reveal instances of attacks under circumstances that suggest conditioning. HUNT (1954) described a patient who got an attack when he saw horses on a motion picture. GROEN and BASTIAANS (1953, 1954) have postulated on the basis of clinical observations that the coincidence of shortness of breath, of whatever cause, with an oppressive life situation, may produce a conditioning to the effect that at a later date either "organic" irritation of the airways or the psychic effect of an oppressive interhuman conflict situation, may bring about the asthmatic type of breathing. These authors give several examples to illustrate their hypothesis. On reviewing these data, it appears that the concept of conditioning as a cause of attacks of asthma has been accepted both by allergological and psychosomatic investigators, but on the basis of remarkably few observations.

Physiologists have contributed considerably to our knowledge of the conditioned reflexes of the respiratory tract in the experimental animal (FREEDMAN, 1951) and even in the human (BYKOV, 1953). Especially changes in depth and frequency have been recorded, but these changes cannot be identified with attacks of asthma. The observations of NOELPP and NOELPP-ESCHENHAGEN (1951a, b, c; 1952) seem, however, of special significance in this respect. These investigators exposed guinea-pigs a number of times to the simultaneous influence of a sound stimulus and to an aerosol of a protein to which the animals were sensitized. In some experiments a histamine spray was used. After a number of simultaneous exposures it was possible to register an asthmatic type of breathing after the exposure to the sound stimulus alone.

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These results in the guinea-pig seem clearly related to our clinical observations. They provide an argument in favour of the possibility of conditioning as a cause of human asthma of the same order as the results of the allergic investigations in this animal supporting the hypothesis of allergic mechanisms in the human.

In this connection, attention should be drawn to the changes in rate, rhythm, and patterns of respiration that occur when experimental neuroses are produced in animals by the use of conditioned reflexes (ANDERSON and PARMENTER, 1941; LIDDELL, 1951). Especially noteworthy are the experiments of MASSERMAN and PECHTEL (1953), who described severe asthmatic attacks, lasting for hours, in several of their neurotic monkeys, and the observations of GANTT (1944) in his experimentally neurotic dog Nick, who developed "a loud raucous breathing with quick inspiration and laboured expiration, . . . accompanied by a loud wheezing as if the animal were hoarse." "Examination of the dog by an internist showed that there was no true bronchial constriction except in the large bronchi." This description is the more interesting, as constriction of the large bronchi has been shown by us to be a regular occurrence in severe asthmatic attacks (DEKKER and GROEN, to be published). It is also noteworthy as an experimental counterpart of the observation in our patients this "this loud forced breathing would usually begin when the dog was brought from the paddock, and increase as the experimental room was approached, disappearing in reverse order. However, it was sometimes present in other situations when he became excited." This, together with those of NOELPPS, is the best description to our knowledge of "conditioned asthma" in experimental animals.

What is the significance of our observations as a contribution to the knowledge of the cause of attacks in general, and more specifically of psychogenic attacks? Are they incidental observations or is a similar mechanism responsible for the provocation of a considerable number of so called "spontaneous" attacks of asthma? The occurrence of conditioning during the investigations for the presence of inhalation allergy is by no means the rule. We have exposed other patients to much greater series of inhalations of allergens, to which they were hypersensitive, in the same room, with the same apparatus. They reacted to these exposures by attacks, but no conditioning to the situation developed, although our attention was constantly directed to its eventual occurrence. Apparently the possibility of becoming conditioned by this technique was restricted to relatively few patients. Of further importance in this respect is the observation, that patient *B* (case 2) lost her ability to be conditioned by this method, after 11 months, during which she was treated mainly with group psychotherapy. Her personality changed considerably during this time and apparently it also changed her preparedness to develop conditioned attacks in the particular laboratory setting. This seems to show that the preparedness to conditioning may fluctuate during life, and is not only dependent on the individuality of the patient or on the nature of the environmental setting. Both patients greatly feared the allergic investigations at the time when they developed their conditioned attacks, and it may well be that the emotional attitude of an individual towards a given situation, in this case the laboratory investigation, may be an important factor in determining whether he will become easily conditioned or not. The influence of anxiety as a factor in the development of conditioned responses is familiar to most animal experimenters in this field; it has been shown to be of decisive importance in the establishment of experimentally induced conditioned reflexes in man (WELCH, 1953). However this may be, it is obvious that the technique which we have used for the demonstration of conditioning as a cause of asthmatic attacks it is not suitable for the majority of patients. The question whether all psychogenic attacks of asthma can be interpreted as conditioned responses, cannot be answered from the evidence here presented. Neither is it possible to give any experimental support to the hypothesis that a large number of so-called spontaneous attacks are in reality the results of conditioning of some kind. As no other exact investigations are at present available, it is only possible to speculate on the subject.

The problem of how important may be the role of conditioning as a cause of ordinary asthmatic attacks, is intimately connected with the question of whether other psychological functions like memory, learning and habit formation are accepted as fundamentally based on the neurophysiological mechanism of conditioning. Even if this is the case, we have to admit that the quantity of component conditionings and the complexity of their interrelation may become so great, that originally simple conditioned responses develop into intensely integrated reaction patterns that are widely different from the simple conditioned reflex. If this applies to the conditioned asthmatic attack, one can expect that the environmental stimuli become integrated with stimuli of an allergic, chemical, physical, or bacterial nature, whereas the preparedness for further conditioning or deconditioning depends on hereditary and acquired constitutional, neurophysiological, and endocrine factors, upon which are imprinted the events of the life history of the patient. For this concept it is immaterial whether the unconditioned stimulus is furnished by an allergen or by an emotionally

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oppressive situation, as hypothesized respectively by allergological or psychosomatic investigators. But the question remains whether conditioning as a cause of attacks is a rare or frequent mechanism.

In order to answer this question it seems methodologically necessary not to give too wide a meaning to the "conditioned" attack and to reserve the use of this word to those instances in which a chain of events, containing the simple components of (a) an attack, (b) a simultaneous exposure to an originally ineffective stimulus, which (c) consequently becomes effective when applied alone, are discernable. We are at present occupied with devising a better method by which to study the possible importance of conditioning in the production of asthmatic attacks, based on this principle.

Our observations also raise some therapeutic problems. The rigidity with which the patients remained attached to their conditioned behaviour was no less impressive than the rapidity with which it developed. A therapeutic appeal to their logical insight failed. The effect of our first attempt at "personal" psychotherapy, including a discussion of their life conflicts and aimed at giving the patients strong support, was not very impressive. Long-term group psychotherapy appeared to have a favourable effect in one case. It seems that there is a need for a more specific deconditioning therapy that makes the conditioning disappear in the same way in which it came.

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SUMMARY

Two patients suffering from severe bronchial asthma who had a skin sensitivity to grass-pollen and house-dust extract, respectively reacted to the inhalation of an aerosol of these allergens, in the laboratory, with an attack of asthma. After these exposures they also showed attacks of asthma after the inhalation of the neutral solvent, or of oxygen, or even after the introduction of the glass mouthpiece, when this was not connected to the inhalation apparatus.

These phenomena were interpreted as a result of conditioning by the simultaneous exposure of the patient to the inhalation of the allergen and to the situation in which this took place. Deconditioning by psychotherapeutic supportive interviews proved difficult and its success was temporary.

The relative importance of conditioning in the genesis of attacks of asthma in general and of psychogenic attacks in particular is discussed.

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A CROSS-VALIDATION STUDY OF THE HYPOTHESIS OF PSYCHOSOMATIC SPECIFICITY, WITH SPECIAL REFERENCE TO BRONCHIAL ASTHMA*

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INTRODUCTION

IN recent years psychological tests have frequently been used to test that part of the hypothesis of psychosomatic specificity that can be formulated as the hypothesis of a correlation between definite somatic disorders and definite patterns of behaviour of the patients with these diseases. By means of these tests, the behaviour of the patients can be compared with more precision than by means of the psychiatric interviews. In the literature there are several comparisons of different groups of patients in terms of scores of a large number of test variables. From possible differences found between experimental and control groups in test variables selected *ad hoc*, conclusions are derived about the "personality" of the members of the experimental group. These conclusions are compared with the behaviour descriptions of the psychiatrist. There are two objections against this method.

1. Every test variable can have several meanings, so that there is danger that the investigator attaches that meaning to a difference, which corresponds with the hypothesis to be tested, without sufficient care to exclude other possibilities.
2. If a difference between two groups of patients is found in a test variable *ad hoc*, it is uncertain whether the difference is relevant or not: it may be a chance difference between the samples of the experimental and control group. This cannot be ruled out, as the samples have not been constructed independent of the hypothesis for the simple reason that there was no hypothesis at all.

Instead of this "trial and error" statistical approach to the test data, by which one does not start, but at best ends with, an hypothesis, it is more fruitful to follow the hypotheticodeductive method: that is, first to formulate the hypothesis and to select the test variables accordingly.

In postulating fruitful hypotheses for psychosomatic research, one cannot confine oneself to the standard classifications of psychology and psychiatry. Scientific discriminations have a pragmatic meaning. Classifications of intellectual capacities, for example, are fruitful in relation to school and vocational selection, psychiatric differentiations in relation to prognosis. But it would be a surprising coincidence if classifications which have proved fruitful in psychiatry and psychology for certain aims should also correspond to somatological classifications in internal medicine. In other words: If the existence of psychosomatic specificity is made to depend on the existence of a correlation of certain somatic disorders with definite

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psychiatric syndromes or definite psychological types, then it is not likely that the hypothesis will be confirmed.

If it is doubtful whether psychiatric syndromes or psychological typologies are fruitful in the investigation of psychosomatic specificity, one has to look for psychological discriminations which in terms of behaviour correlate with somatological classifications of disease.

From phenomenological description, by means of biographical anamnesis, psychoanalysis, and other methods, a number of hypotheses have been formulated on the characteristic behaviour of patients suffering from certain somatic diseases. Each of these hypotheses can be seen as an exemplification of the general hypothesis of psychosomatic specificity. In this study, three hypotheses referring to asthmatics were tested. In spite of recent criticism, the Rorschach test was used. We consider the use of the Rorschach test in a scientific investigation justified if the responses are not interpreted but predicted, as was done here.

The task can be formulated as follows: Testing the hypothesis that certain patterns of behaviour are characteristic for asthmatics has to be done by deriving predictions from psychiatric hypotheses on the behaviour of asthmatics. These predictions have to refer to the Rorschach responses to be expected from asthmatics, in distinction to the responses of a control group. In this study the control group consists of peptic-ulcer patients.

HYPOTHESES

In selecting the hypotheses concerning the behaviour of asthmatics, we have been guided by the importance attached in the psychosomatic literature to certain behaviour patterns and the possibilities of objective testing of these patterns by the Rorschach test.

If one looks for the characteristic behaviour of asthmatics, one can draw a parallel with CANNON's (1929) view on hypertension. CANNON considers high blood pressure as the physiological correlate of rage. In this way it is possible to see the asthmatic attack as the somatological correlate of feelings of oppression. BASTIAANS and GROEN (1953, 1955) have pointed out the special tendency of asthmatics to react with feelings of oppression and constriction to certain environmental situations. The question of cause and effect does not enter the range of this investigation. For our purpose, the following hypothesis can be derived from this statement:

1st hypothesis. Asthmatics show more signs of feelings of oppression or constriction than patients suffering from peptic ulcer. If this hypothesis is correct, the Rorschach records of asthmatics, as compared with those of ulcer patients, will contain more responses which meet at least one of the following criteria:

(a) The response concerns a wholly or partly enclosed space which can contain human beings or animals: cave, cage, aquarium, shell, etc.
(b) The response concerns people or animals living in an enclosed or confined space: cocoon, oyster, mole, goblin, etc.
(c) The response concerns people or animals restricted in their freedom of action: tied hands or feet, etc.

GROEN (1950) described sadistic traits in the behaviour of asthmatics; he judged their aggression as being of a hostile kind. The aggression of the ulcer patients,

on the other hand, was described as of a more competetive nature (GROEN, 1947; 1951). The second hypothesis therefore can be formulated as:

2nd hypothesis. Asthmatics show more signs of hostile wishes than ulcer patients. If this hypothesis is correct, then the Rorschach records of asthmatics must contain more responses that can be classified under hostility, as defined by ELIZUR (1949), than the records of ulcer patients do.

Another difference in the behaviour of asthma and ulcer patients, according to GROEN (1950; 1951), is the strong inclination of the former to impulsive behaviour.

3rd hypothesis. Asthmatics are more inclined to impulsive behaviour than ulcer patients. If this hypothesis is correct, it is to be expected that asthmatics show a higher weighted score than ulcer patients on the cross-validated Rorschach signs of impulsiveness of HOLTZMANN (1950).

SUBJECTS

The Behn series of the Rorschach cards was administered to twenty-five asthma and thirty-three ulcer patients, who had been admitted once or more to the Second Medical Service of the Wilhelmina Hospital in Amsterdam during the years 1951–1953. At this service the patients were diagnosed as bronchial asthma or peptic ulcer after extensive clinical and laboratory investigations.

Apart from the medical criteria by which the subjects were distributed over the experimental (asthma) and control (ulcer) group, these groups were chosen to correspond as closely as possible. Therefore not all of the fifty-eight patients were used for the investigation. Two groups of twenty patients each were formed in such a way as to have a close resemblance in the following respects, all of which might have an influence on the Rorschach protocols:

1st—*Sex:* all patients were males. 2nd—*Examiner:* all patients were tested by the same examiner, not the author. 3rd—*Test situation:* all patients were admitted to and tested in the same hospital department. 4th—*Domicile:* all patients were living in Amsterdam. 5th, 6th, and 7th—*Age, intelligence* (Wechsler Bellevue intelligence test, verbal scale): *occupational level* (computed according to a 0–10 rank social level list of different occupations, standardized by the Institute of Social Research of the Netherlands Population). The figures illustrating the resemblance of the experimental and control group for these variables are given in Table 1.

TABLE 1

	Asthma $N = 20$				Ulcer $N = 20$	
	Mean	S.D.	P_1	P_2	Mean	S.D.
Age	46·3	14·4	0·87	1·00	48·1	14·8
I.Q.	113·5	7·2	0·62	0·54	112·6	8·5
Occupational level	7·5	1·12	0·62	0·54	7·75	1·4

The *P*-values (computed with respectively the test of Wilcoxon and the *F*-test in Table 1, referring to respectively the level and disparity of the groups, do not lead to the rejection of the supposition that the two groups concerning age, intelligence, and occupational level come from the same population. Therefore, if statistically significant differences should be found in the selected Rorschach scores, as predicted under the heading "Hypotheses," these differences may reasonably be ascribed to the experimental factor.

The scoring of the protocols and the classification of the criteria outlined above were all done by the author. Although the author did not know the patients personally, nor their case-histories, he did know when he was scoring the origin of the responses. This means that he knew whether a response was from an asthmatic or from an ulcer patient. This methodological shortcoming was avoided in the cross-validation study.

RESULTS

In Table 2 the findings in the test-variables, described under the heading "Hypotheses," are listed:

TABLE 2

Rorschach variables	Asthma $N = 20$			Ulcer $N = 20$	
	Mean	S.D.	P[4]	Mean	S.D.
Oppression[1]	5·5	4·0	0·02	2·6	4·0
Hostility[2]	12·0	8·7	0·03	7·3	5·8
Impulsiveness[3]	+0·15	1·46	0·049	−0·65	1·52

[1] Oppression: number of "oppression" responses in per cent of *R*.
[2] Hostility: number of "hostility" responses in per cent of *R*. (Contrary to Elizur nos 1- and 2-scores were distinguished).
[3] Impulsiveness: Weighted score of Holtzmann's signs.
[4] The one-tailed *P*-values are computed by the test of WILCOXON.

CROSS-VALIDATION

The results were cross-validated on fresh samples of asthma and ulcer patients. This time the ordinary Rorschach cards were used.

Subjects

The Rorschach test was administered to twenty-three asthma and twenty-two ulcer patients, who had been admitted once or several times during the years 1953–1955 to the Second Medical Service of the Wilhelmina Hospital in Amsterdam. Again two groups of twenty subjects each were formed in such a way that these groups showed a high degree of correspondence in the seven aspects described in the foregoing paragraph:

1st—*Sex:* all patients were male. 2nd—*Examiner:* of both groups, sixteen patients were tested by one and four by another examiner. 3rd—*Test situation:* all patients were admitted to and tested in the same hospital department. 4th—*Domicile:* all patients were living in Amsterdam. 5th, 6th and 7th—*age, intelligence, and occupational level* of these subjects are given in Table 3.

TABLE 3

	Asthma $N = 20$				Ulcer $N = 20$	
	Mean	S.D.	$P.1$	$P.2$	Mean	S.D.
Age	40·0	13·6	0·76	0·54	38·1	13·3
I.Q.	110·8	12·0	0·79	0·21	110·2	10·6
Occupational level	6·5	2·0	0·85	1·00	6·375	2·3

The two-tailed *P*-values, computed as before, again do not give cause for the rejection of the supposition that the groups *qua* age, intelligence, and occupational level come from the same population.

Method

The methodological shortcomings of the first experiment were avoided by eliminating any possibility of contamination in the following way: Each response of

all patients was copied by an assistant on a single card. These cards were coded in a way unknown to the author. After coding the cards were shuffled extensively. Only then were the nearly 1200 cards judged by the author, using one after another the criteria described in the section: "Hypotheses." After this the author was supplied with the code, so that the results could be calculated.

It should be stressed that none of the patients were examined by the author himself, nor did he know any of them personally nor their life history, nor did he take part in copying the responses. In this way every possibility of contamination was ruled out, the more so as a possible "halo effect" was eliminated.

Results

In Table 4 the findings of the cross-validation study are listed.

TABLE 4

	Asthma $N = 20$			Ulcer $N = 20$	
	Mean	S.D.	P^*	Mean	S.D.
Oppression	4·8	4·6	0·03	1·9	3·9
Hostility	12·1	7·8	0·04	8·3	6·2
Impulsiveness	−0·25	1·8	0·47	−0·5	1·5

* The one-tailed *P*-values are again computed with the test of WILCOXON.

CONCLUSIONS

From these results the following conclusions can be drawn:

1. In consequence of a shortcoming in methodology in the first experiment, the possibility of a bias of the author was not eliminated. Thus, the first experiment admits of only tentative conclusions; even so they supported the hypothesis of psychosomatic specificity. But their main value is the possibility they gave to cross-validation.

2. In the cross-validation study all differences are in the predicted direction. This does not mean very much in itself, because with three variables there is chance of this result: $P = 0{\cdot}125$. As there are no reasons to suppose that the three hypotheses are interdependent, we may make use of the combined *P*-value. When we take into account the size of the *P*-value 0·03, 0·04, and 0·47, and combine them, then we find $P = 0{\cdot}013$. Thus, our figures strongly support the hypothesis of the correlation between certain somatic disorders and certain patterns of behaviour.

3. By this investigation the general hypothesis of psychosomatic specificity is supported.

SUMMARY

In order to test the hypothesis of psychosomatic specificity, a difference in the frequency of three categories of Rorschach responses were predicted for the records of asthma and peptic-ulcer patients. Experimental and control group were matched for several factors independent of the hypothesis. The figures supported the hypothesis of psychosomatic specificity. This result was confirmed in a cross-validation study, in which the test scores were assessed objectively and due precautions were taken to prevent contamination and halo effect.

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A PSYCHOLOGICAL INVESTIGATION OF THE EFFECT OF GROUP PSYCHOTHERAPY IN PATIENTS WITH BRONCHIAL ASTHMA*

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INTRODUCTION

THE development of exact research in clinical psychology has cast doubts on several formerly unchallenged views in psychiatry and applied psychology. Amongst others, the assumption that psychotherapy is beneficial for neurotic patients has been questioned. To prove such a beneficial effect, examples, however impressive, do not suffice. After the appearance of publications like those of HEBB (1949), EYSENCK (1952), and ZUBIN (1953) in which the existence of the effect of pyschotherapy has been doubted on good grounds, we are forced to attack the problem by scientific research methods.

The paper of EYSENCK (1952) has aroused widespread interest. Based on a survey of the present literature, this author concludes that about two out of three patients show some improvement after a control period, independent of whether the patients received some form of psychotherapy or not. EYSENCK (1952) concluded: "The figures fail to support the hypothesis that psychotherapy facilitates recovery from neurotic disorder." ROSENSWEIG (1954), LUBORSKY (1954), and RAUSCH (1954), for instance, have tried to refute these arguments. Although there may indeed be some weakness in his paper, the question still remains: Where is the positive proof of the effect of psychotherapy?

MEEHL (1955) surveyed the literature on the attempts to prove this effect scientifically. The harvest was small, for nearly all studies showed methodological shortcomings. He concluded that there was still no positive proof.

Great interest in this subject appears in most recent literature. Probably the most important work in this field has been published by ROGERS and DYMOND (1954) referring to nondirective psychotherapy. In their book, "Psychotherapy and Personality Change," behaviour changes after psychotherapy are demonstrated in several ingenious ways. But the control groups show disadvantages; they consisted of patients who had to wait for their psychotherapy. The interval between test and retest was so much shorter for the controls than for the patients that the work of ROGERS (1954) and his co-authors loses much of its conclusive force by this error.

TASK

Much discussion is possible on the concept of what constitutes psychotherapy and on what one considers its effect. Without going too far on this point, it seems that the concept of psychotherapy loses much of its sense if it is taken so widely that every attempt to influence a fellow man in his behaviour by psychological

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means would be defined as such. In this paper *psychotherapy* is defined as *the procedure by which a therapist purposively and systematically attempts to influence a patient by psychological means, so that the symptoms and signs inducing the patient to consult the therapist disappear or decrease. By systematic we mean that the therapist attempts to use scientific psychological methods.*

Undoubtedly, others will prefer a different formulation, but this definition proved fruitful for our investigation. It is more difficult to define the effect of psychotherapy in a testable form.

For example, a change in the patient's feeling of happiness in a positive direction may be of great practical importance, but psychology cannot investigate such a change scientifically at this moment. With the purpose of our study in mind, we therefore defined the effect of psychotherapy as: *A decrease of the symptoms and signs that induced the patient to consult a therapist or a change in behaviour correlated with these symptoms and signs, as a consequence of psychotherapy.*

Casuistic evidence always remains anecdotal in this connection, for a human being is subject to so many uncontrollable influences, that it is impossible to demonstrate that psychotherapy has been an important causal factor in possible changes in his behaviour. What we need, therefore, is a comparison of a number of patients who have received some form of psychotherapy, with a number of patients suffering from the same sort of symptoms and signs who have not received psychotherapy. When it is assumed that all other influences, apart from the experimental factor, are equally active on both groups of patients, possible differences in behaviour changes between the two groups may be attributed to the experimental factor.

Therefore, the problem generally formulated is now:

Is there a higher degree of decrease of the symptoms and signs (or of the change in correlated behaviour) of patients having received some form of psychotherapy, than of patients with the same sort of symptoms and signs who have not received psychotherapy?

METHOD

For our purpose it is necessary to apply a method with which the behaviour of different individuals at different times can be compared. A means may be found in psychological tests, by which the situation which the behaviour refers to is standardized. We had the opportunity to examine thirty-six asthmatic patients twice with the Rorschach test, with a test interval of about 19 months. In this period eighteen of them received group psychotherapy and eighteen of them did not.

We consider that the use of the Rorschach test in this type of scientific investigation is justified, if we do not interpret but predict the responses. Three categories of Rorschach responses (see paragraph: Hypotheses) were investigated on their frequency in the seventy-two records. In order to eliminate every possibility of an influence of a bias on the author, the following precautions were taken:

(a) The author did not examine the patients himself. He did not know the patients personally, nor did he know anything from their case histories.

(b) Every response of all seventy-two records was copied by the assistant who examined the patients, on a single card; after this, each card was coded in a way unknown to the author.

(c) The cards were shuffled extensively, so that the author who had to classify a response on the criteria to be described below, only knew that it was from an asthmatic. He did not know whether the response was from a patient from the experimental or from the control group, nor did he know whether the response was from the first or the second record of a patient. In this way every possibility of contamination was prevented, and therefore any influence of a prejudiced investigator was eliminated.

(d) Only after the author had classified each response, did the assistant gather together the cards in their original order, so that the results could be calculated.

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Subjects

Thirty-six patients, admitted one or more times during the years 1951–1955 to the Second Medical Service of the Wilhelmina-Gasthuis in Amsterdam, diagnosed after extensive clinical, rontgenologic and laboratory investigations as bronchial asthmatics, were examined by means of the Rorschach test. Eighteen of them received, as out-patients, group psychotherapy twice a week. Ten of these patients were males with Dr. J. GROEN, serving as therapist, eight of them were female patients with Dr. H. E. PELSER as a therapist. Both therapists are physicians. Without further considering the kind of therapy, we mention that the patients were encouraged to express their problems freely and discuss them together (GROEN, 1953; GROEN and PELSER, to be published).

The control group also consisted of ten males and eight females. Just as the patients from the experimental group, so the controls received several forms of "somatic" therapy in addition to the group therapy. As far as this is concerned, there was no systematic difference between the experimental and the control group.

There was a close correspondence between the two groups in several other factors, independent of the hypothesis of the effect of psychotherapy, but with a possible influence on the results. The mean interval between test and retest was for the experimental subjects 18·9 months; for the controls 19·8 months, with a two-tailed *P*-value for the difference of 0·78; the mean I.Q.s (Wechsler-Bellevue test, verbal scale) were respectively 110 and 106, with a *P*-value of 0·33. The mean ages were respectively 46·3 and 39·3 years, with $P = 0{\cdot}07$. The last difference is nearly significant, but as the controls are younger, it would not explain possible differences in the direction of our hypothesis. Finally, it should be mentioned that every patient was tested and retested by the same examiner.

These control measures are such, that if we should find significant differences between the experimental and the control group in some Rorschach categories in the predicted direction, we may reasonably attribute these differences to the experimental factor, that is to say to the effect of psychotherapy.

HYPOTHESES

As mentioned before, behaviour changes, however important in reality, may nevertheless be inaccessible to scientific investigation, at least with the methods at present available. In our attempts to overcome this difficulty, we made use of the findings described elsewhere (BARENDREGT, 1957). In former investigations we could demonstrate in the Rorschach records of asthmatics a relatively high frequency of "oppression" and "hostile" responses. The definition of these "oppression" and "hostile" responses is described elsewhere (BARENDREGT, 1957). These responses could be assessed objectively, and we did not interpret but predict them. It is justifiable therefore to regard these responses as behaviour patterns, correlated with the symptoms and signs of asthma patients.

According to the literature on group psychotherapy (GROEN, 1953; HULSE, 1955; TALLAND, 1955; MILBERG 1955; BARENDREGT, 1957; GROEN and PELSER, to be published), we cannot expect real changes in the character of the patients by this kind of therapy, but a certain degree of release from tensions, fears, and inhibitions. Apart from the question what exactly is meant by this, so much is obvious from this literature, that group therapy, if it should have an effect, should produce a decrease in the Rorschach records of the number of "oppression" responses. In contrast to this, we may expect an increase of the number of "hostile" responses as the hostile wishes should be expressed more openly.

To these we add a category of Rorschach responses which can be described as responses in which the perceived object is damaged in one way or another, for example bloody feet, rotten leaves. Though the name of this category depends on the frame of reference used by the authors (SCHAFER, 1954; KLOPFER, 1954)

who have described these responses, there is agreement in the Rorschach literature on the negative correlation of these responses with health, independent of the way it is defined. Referring to the generally formulated hypothesis, we may therefore expect a decrease in the number of "damage" responses after group-therapy. Consequently, the hypotheses to be tested are:

1. In comparison with the control group, the experimental group of asthmatics shows a decrease in the number of "oppression" responses when we compare their responses after 19 months of group psychotherapy with their responses before the onset of the therapy.
2. In comparison with the control group, the experimental group shows an increase of the number of "hostile" responses when we compare their first and second Rorschach record.
3. In comparison with the controls, the experimental group shows a decrease of the number of "damage" responses when we compare their first and second Rorschach records.

RESULTS

The findings are listed in Table 1, where *M* is the mean of the number of responses of a category in percentage of the total number of responses. The one-tailed *P*-values were computed with the test of WILCOXON. They refer to the difference between the experimental and control group in the difference in percentage between the first and second Rorschach records.

TABLE 1

	M therapy		*M* non-therapy		*P*-values
	I	II	I	II	
1st hypothesis	4·12	1·54	2·83	2·03	0·05
2nd hypothesis	4·37	5·34	3·81	4·64	0·46
3rd hypothesis	0·94	0·63	0·44	1·53	0·08
Combined *P*-value					0·04

All differences are in the predicted direction. But only the first reaches statistical significance. The difference referring to the second hypothesis is very small, and the difference referring to the third hypothesis is in the first place due to a change in the negative direction of the control group. Possibly this difference can be interpreted as a preventive effect of the group therapy, but this of course is only a hypothesis *ad hoc*.

As there are no reasons to suppose that the three variables are not independent, we may make use of the combined *P*-value. This figure, $P = 0{\cdot}04$, gives reason to reject the Null-hypothesis. Therefore our figures support the hypothesis that psychotherapy has a beneficial effect.

SUMMARY

The hypothesis of the existence of an effect of psychotherapy was tested. Thirty-six asthmatics, eighteen of them receiving group psychotherapy, were examined twice with an interval of 19 months by means of the Rorschach test.

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The effect of psychotherapy was defined in a testable form. The responses were not interpreted, but predicted. Every possibility of an influence of a possibly biased investigator was eliminated. Three predictions of changes in Rorschach responses were made. The results gave reason to reject the Null-hypothesis on the difference between experimental and control group. The figures therefore support the hypothesis of the existence of an effect of group psychotherapy in asthmatic patients, and consequently of psychotherapy in general.

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A CASE OF MALIGNANT HYPERTENSION, TREATED WITH PREFRONTAL LEUCOTOMY AND PSYCHOTHERAPY, FOLLOWED FOR OVER EIGHT YEARS*

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CASE HISTORY

ON 22 December 1948 a 37-year-old plumber was admitted in a severely ill condition. For two years he had suffered from headaches, fatigue, poor appetite, nausea, and occasional vomiting. After a very severe attack of headache and vomiting in April 1948 his eyesight had begun to decline, for which he had been admitted to another hospital. He was treated with a salt-free diet and discharged in August of the same year. Since that time he had been unable to work. His headaches increased in severity and frequency; they were usually located in the back of the head and if severe were combined with vomiting. When admitted to our hospital he had been in such an attack of vomiting for four days, in the course of which he had gradually become "dull" in the head.

Just over two years ago, a short time before his present complaints began, he had been treated elsewhere because of a syphylitic primary affect, which had healed in the seronegative stage. Otherwise the patient had always been healthy.

His mother is receiving therapy for hypertension and chronic constipation; the father is reported in good health, so are the patient's brothers and sister, his wife and two children.

Medical examination revealed a severely ill man in a somnolent condition, looking pale and somewhat puffy in the face. The pulse-rate was 104/min, the pulse felt "hard", and the blood pressure was 210/140. On further examination the heart was found dilated one or two centimetres to the left of the midclavicular line; a pericardial friction rub was present on auscultation. The other internal findings were irrelevant.

Ophthalmoscopy revealed swollen, pale, and edematous optic discs bilaterally; the retinal arteries were extremely narrow, irregular, and tortuous. In the macular areas of both sides extensive exudates of hypertensive retinopathy were visible; elsewhere in both fundi, haemorrhages and exudates were also observed. The whole picture represented a severe degree of hypertensive retinopathy of grade 4, according to KEITH and WAGENER's classification (1939).

The urine showed an albumen content varying from 0·5 to 2‰ during the observation period. Occasionally, urobilin was found in increased amounts. The sediment contained some leucocytes and hyalin cylinders. The blood urea amounted to 174 mg per cent at the time of admission. A notable degree of isochromic anemia was found (hemoglobin 33 per cent; erythrocytes 1,620,000 per mm^3); the leucocyte formula was normal.

The Wasserman and Sachs Georgi tests were negative.

A diagnosis of malignant hypertension was made.

Therapy consisted of intravenous administration of glucose for two days, after which the patient was again able to take a sufficient quantity of a low sodium and protein diet by mouth. Upon this the blood urea dropped gradually; after one month it had fallen to 32 mg per cent. The maximum urea clearance, after VAN SLYKE, had risen at that time to 40 c.c./min; intravenously administered phenosulphonphthalein was excreted for 53 per cent after two hours. VOLHARDT's concentration test revealed a maximum specific quantity of 1023; the sp. gr. of the 24-hour urine on salt-poor diet varied between 1006 and 1009. The patient drank large quantities of water and as a rule produced more than 2 litres of urine per day.

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At the time of admission the electrocardiogram showed negative *T* waves in all three standard leads, which was interpreted as being caused by the uraemic pericarditis. After two weeks the electrocardiogram showed only a low *T* wave in the second, and a biphasic *T* wave in the third lead.

Although it was apparent from these findings that the patient's condition had improved, especially with regard to his renal function, the blood pressure remained high. Even on bed-rest and a rigidly controlled poor sodium diet the systolic blood pressure stayed between 200 and 230 and the diastolic pressure between 130 and 155. Hyperventilation caused no drop in blood pressure; the intravenous injection of 500 mg of tetraethylammonium bromide also had no influence. After the daily administration of 2 × 200 mg prominal the patient became dull and sleepy, but the blood pressure remained high. On one occasion during an emotional interview the blood pressure even rose to 275/190.

The retinopathy did not recede in any respect, the visual function remained poor, and the prognosis—even taking into account the relatively good renal function—seemed very poor.

BIOGRAPHICAL ANAMNESIS

A psychiatric examination could only take place two months after admission owing to the bad condition in which the patient had entered the hospital. It revealed an emotionally immature man of low intelligence who appeared unable to solve the difficulties of the life situation in which he was involved. He was unable to tell much about his infancy and childhood, except that he had already been "absolutely clean" at a very early age. He was the second child out of eight, the son of a "bossy" father who, he said, had drunk heavily when the patient was a boy. The patient remembered his father beating his mother, against which he, as a boy, had revolted already at a relatively young age. The mother was described as a severe but honest and strict housewife. Poverty often prevailed at the home; nevertheless the mother had by careful housekeeping arranged that all the boys had at least learnt a decent trade.

The patient had difficulties in getting through the elementary school; he was transferred to a special school for lower-intelligence children. After having left this school he worked first with a carpenter and then with a plumber. He learned the trade more slowly than others, but finally succeeded in earning his own living as a plumber's mate. He described himself as being very meticulous about his work and as being very clean, taking more care of his clothes than most men. He drank only occasionally, and said that he had fought a few times, especially when he felt that something he witnessed was unjust. "Injustice is the only thing that will drive me mad, otherwise I can fairly well control myself." He had also very rigid norms about honesty and decency which he had "inherited" from his mother.

In 1934 the patient, then 23 years old, married his present wife. According to him, their marriage had been perfectly happy during the first years; however, after the first child was born, he said, his wife's character had changed. For reasons which the patient was unable to explain, possibly because she had suffered too much pain during delivery, she told him in coming home from the hospital that she no longer loved him. She became suspicious of him, felt that he was going out with other women, looked at them in the streets, or beckoned to them from their window. Moreover, she often refused sexual intercourse. (The patient asserted that there was no reason for her distrust; according to the patient's father his son was "perhaps a trifle too familiar" with some of his female neighbours.)

This changed attitude of the wife disturbed the patient's home life. He related that he often tried to bring his wife back to a more cheerful mood by being nice to her, but when she refused to change he became hot-tempered. His wife answered back, and the usual result was that a quarrel arose, against his original intention; indeed, he sometimes treated her during such a row in a much more severe way than he had intended. On certain occasions he had even slapped her, for which he was sorry afterward. Occasionally his wife, during these scenes, had thrown a cooking-pan at his head.

During the German occupation of the Netherlands the patient passed some time in the concentration camp Amersfoort (according to himself, because he was erroneously taken by the German police for a Jew; according to his father, because he was associated with illegal liquor production). In the camp his bodily condition was relatively good. After the liberation he resumed his work as a plumber's mate. Soon, however, he developed the idea of applying for a licence to establish a business of his own. Because of official obstacles, which the patient experienced as very annoying, he had not yet succeeded in this at the time of his admission.

After his coming home from the camp, things were running smoothly for a short time. A second child was born on 8 March 1946; but after that his wife became more troublesome than ever before.

During the war years, when the patient was away, she had earned her own living, and now she wanted to divorce the patient and have her own way again. However, the patient was still too much in love with her; he did not want to give her her freedom, he kept on hoping that their relationship might improve again. He described himself as "occasionally getting mad at her; in such a mood a quarrel might easily arise, but when I felt it coming on, I would run away, and after walking the streets I had forgotten it. But now it is different; I cannot accept that I can't get my wife back." At the end of 1946, according to his story, he had for the first time had extra-marital contact with a prostitute. It happened when he was in a desperate mood because of the continued refusal of intercourse by his wife. When some weeks later he observed a small ulcer on his penis, he had forgotten about the contact and had even showed it to his wife, suspecting no harm. However, after the ulcer had been recognized by his doctor as syphilitic, his wife was asked to come to the out-patient's department for veneral diseases for control, and so she obtained the proof of her presumption of the patient's infidelity. She now started divorce proceedings against him, but the patient told the judge how deeply he repented what he had done, and so the case was suspended to give the marriage partners an opportunity to make it up. After this she did not speak a word to him for many weeks; she told the story to the family and the neighbours and set the children against him. She would not cook for him, refused to mend his clothes, called him "you dirty syphilitic," and every morning when he left for his work, told him that she hoped he would stay away. He was powerless against her now. Again and again he tried to convince her that this happened only once and that he would never do it again. This situation lasted all through 1947; in spite of continued quarrels, the patient steadily refused to consider divorce. On one occasion in 1948 when he made an attempt to get a reconciliation, he asked her to listen to him and give him another chance, but the conversation developed in another quarrel, and the patient became so furious that he assaulted his wife. The next day, in a desperate mood, he tried to finish his life by gas-poisoning. However, his wife smelled the gas, forced the door, together with the neighbours, and thus the whole situation remained the same. A few days after this incident he had the bad attack of headache with vomiting, followed by the decline of his eyesight which led to his first admission. After his return home from the hospital in August 1948, where a salt-poor diet had been prescribed, his wife refused to cook the diet for him; she would not believe that his eyesight was really so bad. In one of their new rows she told him that she wished he had died in the hospital and that she would purposely put more salt in his food to hasten his death. The patient at this left the home to live with his parents. After some time he learnt among other things that his wife had sold his working-clothes and his tools. He went to see her; she would not let him in, but in the door he asked her why she had done this, upon which she replied that she wanted food for the children. "Moreover," she said, "you will never be able to work any more, anyway." Upon this the patient developed the headache and vomiting attack which led to his admission into our hospital. Possibly still another event was involved; viz. a recent talk with his father, who told him that the provision of his diet surpassed the means of his parents and that he had better find accommodation somewhere else.

CONSIDERATIONS

The case was regarded as one of malignant hypertension, in a mentally backward, primitively thinking and acting, emotionally poorly balanced aggressive individual with partly obsessive, partly psychopathic traits who had been involved shortly before and during his illness in a conflict situation which he was unable to solve adequately. Apart from the difficulties with the authorities in connection with his request for a licence to start a business of his own, the conflict situation was completely centred around his ambivalent feelings towards his wife. On one hand, he was strongly fixed to and dependent on her, so that he was unable and unwilling to let her go, even when she so obviously showed him her aversion. On the other hand, his attitude towards her was so aggressive that he had repeatedly been unable to control himself, and assaulted her. The patient's emotional life was completely dominated by this conflict. This central emotional conflict could be formulated as follows: He directed towards the same love-object to which he was rigidly fixed in an obviously passive way, strong destructive aggression, and was unable to discharge

either of these feelings adequately. He offered, in other words, a clear example of an internal conflict situation which has been described by several authors (BINGER *et al.*, 1945; GROEN and REISEL, 1948; WOLFF, 1950; WOLF *et al.*, 1948; WOLF *et al.*, 1955) as typical for patients with essential hypertension. However, because of the mental retardation of this patient, the internal conflict situation practically occupied the whole of the mental sphere. His spiritual life was extremely limited; he had no social interests, no artistic inclinations, no hobbies or distractions that could give him compensation for his lack of gratification; his work in which he had found gratification before gave him little satisfaction at the time because he was frustrated in his attempts to start an independent business. The limited scope of other mental activities gave the central conflict in this case an intensity and predominance such as we had not previously encountered in our hypertensive patients.

The following findings indicated that the unfavourable course of the conflict might rightly be considered as an aetiological factor of importance for the bodily disease:

(a) The time relationship between emotional life events and the progress of the disease, as brought out by a correlation of the medical history and the biographical anamnesis. The patient's symptoms began about the time when the conflict with his wife intensified following the birth of the second child, and especially after her discovery of his luetic infection, which made the situation much worse.

(b) Two complications, respectively flare-ups of the disease (the attacks of severe headaches and vomiting followed by coma and retinopathy) occurred shortly after emotional episodes during which he had experienced his wife's behaviour towards him as intensely traumatic, without being able to act out his own feelings.

(c) A very marked rise of blood pressure (from 215/130 to 275/190) was observed during an interview in which the conflict situation with his wife was discussed with him in a stern objective way. During a friendly conversation no such rise occurred.

The usual internal therapy, by means of a diet poor in protein and sodium, consisting of rice, butter, sugar, and fruits, to which vegetables were added later on, had a favourable effect upon the uraemic condition and renal functions. But continued diet and bed-rest had scarcely any influence on the blood pressure; the headache persisted and the patient still had occasional attacks of vomiting. Neither did the retinopathy improve. Psychotherapy also failed to affect this patient; we did not succeed in making him understand that he had better agree to divorce his wife once she requested this. On one hand, he complained to us that she did not visit him in the hospital; on the other hand, he said that he did not want to see her at his bedside. She came indeed, at our request, but only to tell him that whether he came out alive or dead, she would not have him at the house! Faced with the situation of a wife who wanted to go her own way, the patient showed the rigidity of the hypertensive patient in an unusual degree. He simply could not move out of his ambivalent, both fixed and destructive, attitude towards her. Against this our psychotherapeutic efforts were of no avail.

Since medical treatment as well as psychotherapy were ineffective, we had to consider sympathectomy. However, in view of the failure of hyperventilation, barbiturate sedation, and tetraethylammonium bromide to produce a drop in blood pressure, combined with the risk of post operative orthostatic hypotension which would disable this plumber for his work, we had to abandon this idea. On the other hand, considering the unfavourable prognosis of malignant hypertension, especially if the fundus picture has reached KEITH and WAGENER's degree IV, we realised that, unless some therapy was found, the disease would kill the patient within one or, at the utmost, two years.

These circumstances led us to consider whether prefrontal leucotomy might be indicated. This was no easy decision. Leucotomy is an operation which deeply influences the personality of the patient. Before performing a leucotomy, therefore, one has to take into consideration not only medical, but also moral indications and contra-indications.

As far as the medical aspects were concerned, we felt justified in risking the intervention. We were dealing with a severe disease which had already entered an "incurable" stage (FRANT and GROEN, 1950). Neither diet nor psychotherapy had produced any amelioration, and sympathectomy appeared to be inadequate in this case. On the other hand, the very unfavourable influence of emotional factors had been established by anamnestic as well as by psychosomatic investigations, whereas in view of the known effects of leucotomy one might expect that after the operation the patient would react to his conflicts with less emotional tension, which might at least arrest the progress of the disease. A favourable factor to be considered in this case was the already low intelligence and primitive personality of this patient, which made us less afraid of damage to higher mental functions and of an unfavorable influence on his social position by the operation (MACDONALD TOW, 1955; WIJSENBEEK, 1949). Nevertheless, we also had to consider that in patients with hypertension every operation on the brain will presumably involve a greater risk because of the increased danger of haemorrhage (KOLB, 1953). In summary, we felt that from the medical point of view we were justified in risking an attempt, especially in view of the bad prognosis if nothing at all was done. It was a question of (as written in the notes by the resident in charge) "Must one venture or would one be justified not to venture?"

In respect to medical ethics, the decision gave us more difficulties (*Lancet*, 1954; PRICK, 1949). A leucotomy changes a man in his most essentially human characteristic, viz. his personality. A doctor is therefore justified in performing this operation on his own responsibility only in those mental patients who may be considered as having permanently lost the command of, and responsibility for, their own mental life. In our patient, however mentally retarded he might be, this was not the case. Moreover, it seemed impossible to propound the pros and cons of the operation to him, since this would have meant revealing to him how desperate his condition really was. Supposing that he would refuse the operation, we would have burdened this primitive man, for the short life-span that remained, with the fear of an unavoidable death. Thereupon we decided to discuss the situation with his parents. They were both convinced that a return into his difficult domestic circumstances after a discharge from the hospital would mean certain death. They requested us to try anything that would even give him a theoretical chance of recovery or of bringing the disease to a standstill. They were completely willing to assume the risk of the operation, *quod vitam* and *quod functionam*. After deliberation with Professor VAN DER HORST and the neuro-surgeon Dr. LENSHOEK, the proposal was made to the patient of submitting himself to an operation which "on the one hand involved definite danger, but on the other hand might enable him to overcome his personal difficulties in a better way." After some reflection the patient gave his consent.

POST-OPERATIVE COURSE

On 5 April 1949 Dr. LENSHOEK performed an uneventful bilateral prefrontal leucotomy after FREEMAN. There were no particular difficulties during the immediate post-operative course; the

patient showed the usual coma and dullness, after which he remained disoriented for a few days and was incontinent of urine. The blood pressure, which before the operation was 215/155, was immediately afterwards 220/150. During the next few days it fluctuated between 200 and 225 systolic, and 130 and 150 diastolic. A few days after the operation the patient complained of headache and showed renewed attacks of vomiting. The urea content of the blood rose to 110 mg per cent, but dropped to normal values again after intravenous infusion of 10 per cent glucose and administration of a protein and salt-free (rice) diet for the following days. After three weeks the patient returned to a salt-poor diet with a nearly normal protein content. His orientation was again satisfactory; simple arithmetical problems were satisfactorily solved, and he was gradually mobilized.

During the first days and weeks after the operation he was silent, with almost no spontaneous behaviour or reaction to what happened around him; on one occasion he had a fit of rage when he was teased by a neighbour. During the following period he showed the attitude of a pleasant happy-go-lucky type of fellow. He lived completely by the moment, a friendly word or a simple joke was sufficient to put him into a good mood. He showed little initiative and did not bother to think about the future. On a superficial approach, however, nobody at this time would have supposed that this man had really undergone a lesion in the frontal brain of such an extent. He had no headaches or other symptoms, but his blood pressure was just as high as before the operation.

Gradually we began to discuss his present situation and his future with him. It then became obvious what an immense change in his personality had been brought about by the operation. All the stubborness and rigidity which had so far characterized his attitude in the conflict with his wife, had disappeared. He now appeared easily approachable and influenced by any impulse from our side. It was agreed that on his return from the hospital he should resume living with his parents. Little effort was needed to induce him to try to give up his attempts to see his wife and children again. He easily became accessible to the idea that by giving his wife her divorce he would also release himself from his troubles and that this would mean a great relief to himself. He reacted good-naturedly to our suggestion that he start a new life, as a "free lad," and he quickly "swallowed" our assurance that he with his handsome appearance would have no difficulty in finding another partner for a future marriage. Subsequent to these interviews his blood pressure began to drop! During the last two weeks of his stay in the hospital (27 April 1949–11 May 1949) his blood pressure fluctuated between 215 and 190 systolic and between 150 and 130 diastolic. On discharge (11 May 1949) the condition of the fundi had not altered, and the urine still contained a large quantity of albumin. The headache had not returned.

The patient remained under ambulant psychotherapeutic treatment and control. The first few weeks he got into several troubles. His wife refused to hand over his clothes; a neighbour railed at him in the street, calling him a "dirty syphilitic." He attempted once to bring a present to one of his children on her birthday, but his wife would not let him in. His mother could no longer keep him at home and he had to look for other lodgings; his wife's lawyer began to bother him, and he had to cede a part of his sickness insurance support to his wife, although he heard that she was earning more money than he himself received from charity.

All these difficulties were submitted to us by the patient. On these regular visits he appeared completely dependent. He would tell us what had happened; sometimes re-enacting the events and telling us how he had felt at the moment, but he left the solution of his troubles to us, and was completely satisfied with whatever way we handled the situation. Every time we solved such a problem for him we were able to influence this man with amazing ease by patting him on the shoulder, by a simple joke or the assertion that "so long as you keep on telling us about it, everything will be just all right." He had a complete confidence in the wisdom of the physician and he faithfully obeyed his advice. His bodily condition improved regularly; the headache did not return. During the following months (and years) his systolic blood pressure only once reached 200, the diastolic at that time being 130; usually it fluctuated round 170/115. By August 1949 the eye grounds showed a remarkable improvement. A few months after his discharge the papilloedema began to diminish; after this the exudates disappeared, leaving only some scar tissue. At the same time his vision improved; only the retinal vessels remained contracted and tortuous.

At the end of 1949 the patient asked our permission to resume work during half-days, to which we gave our consent after consultation with the physicians of the Labour Insurance Council. He had officially been declared an incurable invalid and had received insurance subsistence as such. We were amazed when he came back after two weeks to tell us that he liked his job so much that he had

prolonged his working hours into whole days. Since then he has stayed at work, at least when he could find a job. His former illness has not made him stay away from his work for a single day since then.

During the spring of 1950 the patient had on three occasions a dizzy spell, during which he momentarily lost consciousness. We interpreted these attacks as epileptic equivalents in consequence of the operation and gave him some phenobarbitone. Since then he has taken no phenobarbitone for over two years.

By the time of writing our first report (April 1951, two years after the operation) the patient was fully employed. He took a liberal diet, but he added no salt to his meals. The systolic blood pressure fluctuated between 155 and 180 and the diastolic pressure between 95 and 120. The albumen content of the urine, which had remained high for a rather long time, diminished to a faint trace. The "urea clearance" was 56 c.c./min.

The changes in the eye grounds before and after the operation are represented in Figs. 1, 2, and 3. One had the impression that two years after the operation his physical condition had improved to such a degree that one was justified in considering it as a clinical recovery, at least to such an extent that this case of malignant hypertension had been changed into a benign phase.*

FOLLOW-UP STUDIES

As far as his psyche was concerned, the patient proved able to adjust himself fairly well to the requirements of his environment, especially if one considers the type of man he was before the operation and the environment he lived in.

During the six years that have now elapsed since the operation he has been involved in many conflicts, usually because of aggressive behaviour. The type of these conflicts was mostly of the same kind as before the operation, but his reaction was now different. He still frequently clashed with authorities, employers, and anybody who, in his opinion, treated him unfairly. "There is no justice in this world. I am treated like an old rag," is his often-used expression. But when he becomes enraged because of this he no longer controls his feelings like before. Or as he once put it: "I still want to control myself, but I am no longer able to do so." On such occasions he would shout, rage, bang his fists, even fight, or at other times tremble and cry. Often outbursts of rage would be followed by crying spells. However, next day he would come to see us and would tell us what had happened, laughing or without showing any signs of being moved by the incident, as if it had happened to someone else and he had been a bystander. Apparently the emotional discharge had completely relieved him. On one such occasion his blood pressure at the end of the interview was only 140/100. He changed jobs frequently, but as this was also the case before the operation and as it was usually due to some quarrel with his employer, we did not get the impression that the quality of his work was less than before. His sense of cleanliness certainly had not changed. He still clung to his ideal to have a business of his own, preferably in a small village where he would not be speeded up by employers and would not have to work on high roofs, which he disliked doing.

About the summer of 1951, when his blood pressure was usually around 170/105, he started new attempts to obtain the state licence which is required in the Netherlands for anybody who wants to settle down in independent business, and although we feared that this would again bring him disappointment, we were unable to persuade him this time. During the following months he did a full-time job with extra work in the evenings to prepare for the licence examination, making sixteen hours a day, six days a week, and using his Sundays for long trips on a motor-cycle. His blood pressure during this time never rose over 165/110, not even when we saw him shortly after a row with his former wife (whom he had gone to see because he had been told that his daughter stayed out at night). Only on the day before the licence examination did the pressure rise to 180/125, but it came down to 140/95 a few days later.

The only symptoms he had at this time were occasional pains in the stomach, which he had never had before. On examination there was hyperacidity; X-ray studies revealed hypermotility of the stomach, but there were no signs of ulcer or other organic pathology.

The licence examination was not successful. In practical plumbing he did quite well, but in the

*The follow-up course till this stage was quoted by STEWART WOLF, PHILIP C. CARDON, J. B. PFEIFER and HAROLD G. WOLFF in their monograph: *Life and Essential Hypertension*, Baltimore 1955, Williams and Wilkins Cy.

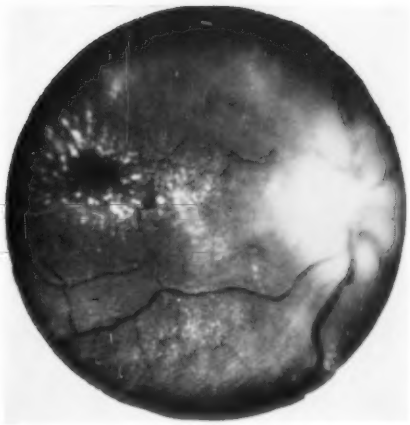

FIG. 1(a).—Right eye. Ocular fundus one month before operation.

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FIG. 1(b).—Right eye. Ocular fundus four months after operation. Impressive improvement of the oedema round the papilla and of the hypertensive retinitis.

FIG. 2(a)—Left eye. Ocular fundus two months before operation.

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FIG. 2(b)—Left eye. Ocular fundus six months after operation. The photographs illustrate the disappearance of the oedema round the papilla, while some improvement in the condition of the vessels is also visible.

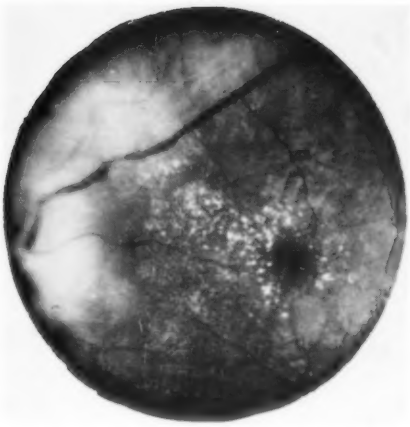

FIG. 3(a)—Left eye. Macular region. One month before operation.

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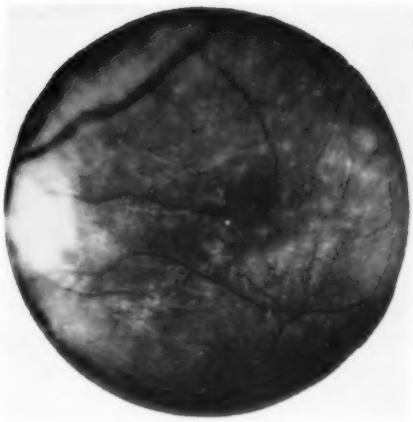

FIG. 3(b)—Left eye. Macular region. Six months after operation. Impressive improvement of the hypertensive retinis.

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theory of his trade he failed. He did not receive the bad news until several weeks after the examination. Unfortunately, at the same time his divorce case was up in court and he was ordered to pay a higher alimony than he felt was right. Moreover, he received no reply from the mayor of a village who had promised him, before his illness, that he could start a business there and to whom he had now written. He also discovered that the raising of the necessary capital to start a business was not as easy as he had imagined, and whereas we had been able up till then to dispel any ill-feelings by simple discussion and persuasion, we could no longer do so. He obstinately clung to this idea of a business of his own, even when we took pains to point out that being in business also meant running the risk of losing money, of being cheated by other people, and that it would bring him a lot of worry which he would never have if he were content to receive his pay every week and have nothing else to bother about. It seemed as if he regained about this time some of his former rigidity, especially when it came out that he had failed in the examination. He could not accept, from his infantile dependent viewpoint, why we were unable to get the unfavourable result reversed. It now appeared that he had also expected that we would lend him the money to start his business, and when we would not do so he began to feel that we, as capitalist doctors, sided with the authorities who had treated him so unjustly. His feelings of being wronged were now transferred to us, and this apparently upset his previously unlimited confidence and dependence on us, filling him with the same ambivalent feelings of love and aggression, this time projected on the doctors. During these weeks his blood pressure rose to 200/130 and his headaches recurred occasionally. When he finally accepted the negative outcome of all his efforts, he felt tired, sad, and dejected, and had crying spells. His pressure at that time was 175/120.

During one emotional interview about these problems the blood pressure rose to 250/150. This proved that the cardiovascular system still reacted to emotions in the same way, but that the emotions were seldom strong enough to produce such a reaction.

Then followed a relatively quiet period with pressure around 160/105, when another difficult time came in the spring of 1952. The patient was dissatisfied with so often having to change jobs, and suddenly decided that he wanted to be a civil servant with a fixed pension in the future. Again he could not be persuaded to give up this idea, and after trying in vain a few times, he became angry and blamed the doctors for not giving him enough support. He again felt aggressive and rejected and had renewed gastric symptoms, loss of appetite, and a blood pressure round 180/120, although he still practically never had headaches. A note in the history mentions that he could now carry his bicycle to the fourth floor without stopping, while before his operation he had had to stop through shortness of breath repeatedly, even without carrying any weight.

Since the spring of 1951 the patient had been in contact with a married woman, four years younger than himself of low intelligence, who was also in the process of obtaining a divorce from her husband, at this time in jail. This husband had a peculiar job; he was a professional "knife-thrower," who would perform at fairs by throwing knives just beside his wife while she stood at a distance of 20 feet. However, he had already undergone several convictions for using his knife too loosely outside his job. Our patient told us that this husband of his present friend had been told in jail about their friendship and had sworn to kill him when he came out, but, so our patient added smilingly, "Why worry about this? He has another half-year to stay and that is still a long time off" (when the rival finally came out of gaol the patient challenged him to open fight from which the knife-thrower, accustomed to attacking from behind, shrank away).

The patient developed fairly satisfactory relations with this woman. He often referred to her as "mother." After several quarrels with his parents, he finally went to live with her, so that she took complete care of him. Their relation however did not pass without troubles. He had several outbursts of rage, e.g. when he was suspicious of her entertaining relations with other men. On one such occasion she told him that if he continued to behave like this she would prefer to go. To this threat he reacted with another rise in blood pressure to 180/115, but not so marked as when his wife had told him that she wanted to leave him.

His new attitude towards his wife remained the most impressive change after the operation. Only very occasionally did he talk about her, but always in a rather detached way. On the last day of 1951, for example, he suddenly got the idea to go and see her, thinking that this day was the right sentimental moment for a reconciliation. Apparently he saw no obstacle, if she did accept him, in leaving his new friend. His wife let him in and he talked with her for an hour. When he went away without being accepted, it was he who told her that he would never see her again. When he

related the story to us he did not seem to be upset, and his blood pressure did not rise during this interview. His attitude to the second woman was similarly detached. He would tell us how happy he was to have a regular life with this woman, praise her for the way in which she took care of his diet, but would continue the conversation by giving as his opinion that the failure of her marriage could not have been only her former husband's fault, and added quietly: "I don't ask questions about her past, but if she ever does silly things while she is with me, I'll throw her out of the window."

In the summer of 1952 he received a blow when it appeared that this friend had a carcinoma of the cervix, that she had to be operated upon, that she would never be able to have any children, and that even intercourse might be impossible in the future. On hearing this he frankly told her that this was another piece of bad luck for him and that he did not want to continue with a "worthless woman." But when she thereupon suggested that he should let her go, he immediately answered that a man would be heartless to do this. Five minutes after he told us about the conversation his blood pressure was 165/110.

Over the following years there were sometimes rows between them, and on a few occasions he even beat his friend, when he was enraged, but these conflicts never lasted long; she would weep, but soon both seemed to forget all about it, and the row always ended with complete reconciliation. On the whole, the patient was the dominating figure in their relationship; she apparently accepted his uncivilized manners. He still related everything that happened to one of us when he attended the out-patients' department. Indeed, the reason for his coming was usually that something was upsetting him. His blood pressure during the years 1952, 1953, and 1954 oscillated between 180/120 (on one occasion) and 130/90 (depending on the situation); it usually amounted to 155/100. His headaches had gone completely, the favourable condition of the fundi persisted, and he was regularly at work.

The most serious conflict developed between the patient and his friend when, after she had obtained her divorce, she wanted her five children to live with her, to which the patient strongly objected. "She will have to choose between them and me," he said. On the other hand, she did not accept his children in their home. Whenever this problem became acute, he would complain about pain in the stomach, indigestion, and anorexia. Another X-ray series of the stomach revealed no organic disease.

In 1954 his friend used to leave the house to visit her children in the southern part of Holland, sometimes for a week, once even for a month. He was not deeply affected by these recurring ruptures of their relation. "I regard her as a housekeeper," he would say. In the first part of 1955 he told us that he had broken with her, after he had met another woman.

This new friend, to whom he later referred as "sister," was of a different type. She was a German housekeeper, who had come to Holland to marry a Dutch sailor she had met in Hamburg. Once here, however, the sailor's mother forbade the marriage and the woman attached herself to the patient. She cleaned the house and took care of his furniture, his diet and his clothes. She kept house so meticulously that the patient's father and mother, who had never approved of his relation with his former "vagabond friend," now wanted him to marry "sister," who would, they felt, take proper care of him. The housekeeper also wanted him to marry her; she had never had a real home in her life, and installed herself in the patient's house to stay. Soon she began to correct him when he was careless in his table manners or came home at irregular hours. She did not do this by a row, like his first friend, but in a reproving, reproachful way, making the patient feel how ungratefully he behaved towards her, who took such good care of him. She never forgave and forgot a row, so that he could not begin with a clear conscience after it was over. On a few occasions he flew into a rage against her, but she only reacted by a show of being unjustly treated, by sulking and not speaking to him for days on end. Against this he was powerless. Once he beat her; she did not weep, but ran away and made him feel what a sin he had committed. In this way she gradually succeeded in dominating him.

When she insisted on being married, he replied that he would never do this without permission of "his second father," by whom he meant one of us. He indeed introduced his "fiancée" to us, but, fearing the results of his marrying this dominating nagging type of woman, we advised him to wait. Partly he seemed relieved, and admitted that he also distrusted how she would develop once he had given himself entirely in her hands by marriage. "After all, you can never trust a German; we have experience enough with them," he said. Oh the other hand, it gradually came out that he had already committed himself and, partly because he had become dependent on her care, partly because he had more or less promised to marry her, our advice brought him into a new conflict. She assumed more and more the attitude of an unjustly treated, righteous woman and turned the tables on him, who had

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always felt superior to her, a German, by calling him "a dumb Hollander." This offended him all the more as she obviously referred to his mental retardation. She also began to nag him about his friendship with and dependence on the doctors. To all this he reacted with "inward" rage; he told us hesitatingly about it, but there were fewer abreactions by rows and no more beatings like before. In December 1955 his new friend proudly told us that she had warned him that whenever he would throw her out or beat her, she would leave him, and that as a result his bouts of temper were diminishing.

Thus he was more or less in the same situation as he had been during the conflict with his first wife.

Medically this change in his life situation, attitude, and behaviour coincided with the sudden occurrence of epileptic fits. The attacks were characterized by typical generalized convulsions, tongue biting and urinary incontinence, followed by unconsciousness of about half an hour's duration. Usually such a fit would occur in the morning after there had been a conflict the previous evening, to which he had not reacted by aggressive behaviour and which had caused him to pass a sleepless night. The first of these attacks occurred on 19 September 1955. It so happened that, in addition to a quarrel with "sister," he had seen his first wife the day before, walking with another man.

In the following year he had these fits mostly in connection with nagging by "sister" or when he got complaints from his youngest daughter about how she was being treated by her mother's new friend. In both cases he feared his own aggressiveness; once he smashed a windowpane instead of attacking his friend and he avoided a visit to his wife's house for fear of stabbing her friend. This last problem he solved rather adequately by calling in the help of the childrens police, who removed the child from the mother's home.

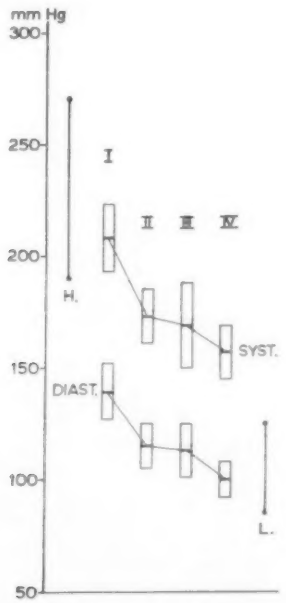

FIG. 4.—Blood-pressure values before leucotomy and during the follow-up study (December 1948–July 1956)

H = highest value ever measured in this patient: 275/190, March 1949, before leucotomy, during emotional interview.

L = lowest value ever measured in this patient: 125/85, January 1956, nearly seven years after leucotomy.

I–IV: Mean values and standard deviations of the systolic and diastolic pressure during successive periods:

I: December 1948–May, 1949; 68 readings, syst. 208 ± 15, diast. 139 ± 13.
II: July 1950–July 1952; 30 readings, syst. 173 ± 12, diast. 115 ± 10.
III: July 1952–July 1954; 30 readings, syst. 169 ± 19, diast. 113 ± 12.
IV: July 1954–July 1956; 14 readings, syst. 157 ± 12, diast. 100 ± 8.

During a short observation in the hospital he had a fit one hour after an argument in the lounge, where two female patients were criticizing a mentally retarded boy. The patient took the boy's side (obviously because of identification), without being able to achieve anything against their remarks.

The epileptic attacks altered for some time with what appeared to be hysterical absences, at moments when he felt himself insufficiently supported by his friends, the physicians. Both diminished in frequency, and disappeared during treatment with diphanthoine and phenobarbitone.

In January 1956 an EEG was made together with blood pressure recordings, during an emotional interview. At the beginning of the session the blood pressure was 125/85, the lowest ever measured in this patient. During the interview the highest value was 155/100, registered in connection with a talk on the conflicts with his friend.

After this period of seizures his blood pressure became somewhat higher. This may have been due partly to a "syndrome-shift" caused by the treatment with diphantoine and phenobarbitone, which by suppressing the abreaction by the epileptic discharges, necessitated another outlet for his expression. Partly it might be caused by the fact that he had been unable to work as a plumber when he had the seizures, and had resumed work as soon as these were suppressed. He usually comes for control at the end of a day's work, sometimes in the open in freezing weather, or after working in unheated new buildings. This may be the reason why, when his blood pressure is measured on a day when he is not at work, it is usually lower than on a regular working day. This should be taken into consideration when evaluating the data of Fig. 4. In this diagram we have brought together the blood-pressure data during four periods. During the first period, from December 1948 until May 1949, the patient was hospitalized before and immediately after his leucotomy. Each of the next three periods covers two years of the clinical follow-up study, starting fifteen months after the operation, i.e. from July 1950 until July 1952, from July 1952 until July 1954, and from July 1954 until July 1956. The last period includes eight months when the patient had seizures and did not work. The chart shows the means and standard deviations of the systolic and the diastolic pressure for each period. During the first period the number of readings was sixty-eight, in the second and third period each thirty observations, and during the fourth period fourteen observations. The difference between the values of the first and the second period is highly significant, F's being 10 for the diastolic and 12 for the systolic pressure, and p nearly infinitely small. The difference between the values of the third and the fourth period is significant at the 1 per cent level. In addition, Fig. 1 contains the highest and lowest blood pressure ever measured in this patient. The highest value (270/190) was found during an emotional interview, referring to his wife, which took place before the operation. The lowest pressure (125/85) was measured before an interview began during the period when he had his epileptic fits.

DISCUSSION

The literature contains a few reports of cases in which prefrontal leucotomy or topectomy has been performed for a psychosis or severe neurosis in patients who were also suffering from essential (but not malignant) hypertension. POOL and HEATH (1948), TIBBETS (1949) and PETIT-DUTALLIS *et al.* (1951) have observed a drop in blood pressure after the operation respectively in two and one of such cases. On the other hand, the results in ten patients described by WATTS and FREEMAN (1942) and CHAPMAN *et al.* (1949a and b) were variable. SARGANT (1951), although not describing any cases, reports similar unequivocal results. So far as we are aware, no cases have been published in which the hypertension itself furnished the indication for the operation.

It is certainly not the purpose of this report to recommend or encourage leucotomy as a routine therapeutic method in essential hypertension. On the contrary, it is our opinion that this form of treatment should only be considered for those very few patients with malignant hypertension for whom no other means of cure seems to offer any prospects. In such a rare instance, however, the operation may apparently be worth the risk; it is, at least, our impression that it saved the life of our patient.

Our observations furnish another indication that emotional tension may represent

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an important factor in the aetiology of malignant hypertension. The knowledge of the neuro-psychiatric mechanism involved is unfortunately too meagre to answer the question which "centres" or nervous pathways are involved in this pathogenesis, and by which visceral mechanisms the emotional tension produces the autonomic or humoral changes that are more directly responsible for the rise in blood pressure and the concomitant bodily changes (WOLF, 1950; PFEIFER and WOLFF, 1950; WOLF and WOLFF, 1951; WOLF *et al.*, 1955). We can, therefore, only offer a provisional suggestion as to the way in which we suppose that the effect of the operation on this patient's blood pressure was brought about. One point in this respect seems certain: the drop in blood pressure did not occur immediately after the operation, but only several weeks afterwards, when we began to help the patient, assisted by the changes in his personality, to overcome his central emotional conflict. This observation suggests that the mere surgical elimination of certain areas of the cerebral cortex did not in itself achieve the therapeutic effect. It seems as if the peculiar rigidity by which this hypertensive patient remained involved in his conflict situation, a rigidity (a rigid conditioning) which was rooted in his obsessive personality structure and which prevented him from adopting a more adaptive attitude towards his life situation, depended upon the intact function of his prefrontal cerebral cortex. It was this mental "rigidity" that changed after the operation. Thus the leucotomy in our opinion had no immediate effect upon the blood pressure, but upon the personality of the patient. We hypothesize that immediately after the operation the emotional tension which had produced the high blood pressure (a) suppressed accumulated destructive aggression, (b) was still present as an "engram "or conditioned response in the circuits of the central nervous system. However, this engram or response was now less strongly maintained, because it was no longer reinforced by former "inprints" from the circuits in the prefrontal cerebral area. This discontinuity of the preoperative ideation (KLEIN, 1952) made it less firmly established and thereby amenable to the new processes of learning or (de)-conditioning, which we introduced by our psychotherapy. Only then did the subconscious feeling state of this man begin to change, and only then did the blood pressure begin to drop.

The concept that this prefrontal leucotomy has only been effective because it provided us with the possibility of a psychotherapeutic influence which we had been unable to achieve before, seems important, since it may serve as a guide for possible future indications and postoperative treatment.

The further course justified this concept. When the patient was in a more favourable life situation, at work, and living with another woman who submitted herself to him, his blood pressure dropped. But on occasions when his life situation became more difficult, e.g. when he was disappointed in his doctors or when the first friend wanted to get rid of him, his blood pressure rose again, even if not to the former level. In the further course of his life the patient became again involved in a situation which resembled the ambivalent conflict he had had with his first wife, even if not so intense. To this he reacted, not by a rise in blood pressure, but by epileptic fits, a pattern of discharge which may have been favoured by the local effect of the operation on the brain (KOLB, 1953). Since 3–12 per cent of all patients are reported to suffer from convulsive disorders. When he had these fits, his blood pressure became almost normal, when they were suppressed by drugs but the conflict situation persisted, the pressure began to rise again.

Thus, not the leucotomy alone, but the effect of a favourable environment (including the therapeutic situation) upon his "new" personality was responsible for the success. What, we ask ourselves, would have been the result if the patient, for example, had returned to his first wife after his discharge from the hospital? In view of this experience, we are inclined to reserve leucotomy in the future for the few cases of malignant hypertension whose course seems irrevocably hopeless, in whom the impairment of their higher intellectual functions does not mean a too great loss, and in whom there is reason to expect that the environmental situation, supported by psychotherapy after the operation, will have a favourable influence on the patient's emotional conflicts.

We realize that this threefold criterion means a great restriction of the indication of leucotomy for essential hypertension, and indeed such is our intention. This we hold to be equally true for patients suffering from other "psychosomatoses" in whom psychotherapy does not succeed and in whom one might otherwise be inclined to consider leucotomy (SARGANT, 1951; WINNIK and ASKENASY, 1950).

Since this patient was first seen other drugs have been introduced which give new possibilities for the treatment of malignant hypertension, some of which may possibly act by way of a "chemical leucotomy." But it was not our main purpose to recommend a form of treatment, but to report a case in which the effect of measures, acting primarily on the central nervous system, on the course of malignant hypertension, seems to support the concept that this disease is of central nervous origin.

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SUMMARY

The authors describe a case of malignant hypertension treated with prefrontal leucotomy and psychotherapy. The operation took place on 5 April 1949. It was not followed by any immediate drop in blood pressure, but the patient became amenable to simple psychotherapy. In the following months and years the blood pressure dropped progressively until it reached high normal average values and the retinopathy and albuminuria disappeared. At present, eight years after the operation, the patient is still engaged in active work, although suffering from some after-effects of the operation.

The authors discuss the importance of this observation for our insight into the aetiology and pathogenesis of malignant hypertension. It is suggested that the leucotomy did not act by a direct effect on the blood pressure, but by the changes it produced in the personality of the patient, especially in his attitudes towards certain of his, presumably specific, conflict situations.

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BLOOD-PRESSURE CHANGES UNDER EMOTIONAL INFLUENCES, IN PATIENTS WITH ESSENTIAL HYPERTENSION, AND CONTROL SUBJECTS*

J. M. VAN DER VALK, M.D.†

INTRODUCTION

MANY publications deal with the momentary influence of emotions on blood pressure. Other papers are concerned with the role of psychological (emotional) factors in the causation of the disease called essential hypertension. In this literature one can generally distinguish between descriptions of the personality "traits," considered to be more or less specific and predisposing for the disease and studies of emotional (interhuman) conflicts which are supposed to be specific and more immediately responsible for the onset or exacerbation of the hypertension (STOKVIS, 1937; ALEXANDER, 1939; BINGER, 1951; BASTIAANS, 1957).

Most authors assume that there exists an analogy between the "physiological" rise in blood pressure which occurs in normal individuals during certain emotions and the pathological increase in blood pressure in essential hypertension. If, indeed, essential hypertension would be the result of prolonged and/or repeated elevations in blood pressure, elicited by certain repeated emotions, or the expression of a sustained cardiovascular reaction produced by a constantly present emotional condition, one could split this general hypothesis into the following specific hypotheses, hinted at by several authors, but not clearly defined:

(1) Certain personality "traits" predispose certain individuals to sustained hypertension because they predispose them to certain emotional conflicts.

(2) The emotional conflicts that cause hypertension in these patients are essentially of the same nature as those that would produce a rise in blood pressure in healthy individuals.

(3) Hypertension patients develop a higher and more sustained rise in blood pressure than healthy individuals, not so much because their *objective* life situation is more stressful, but because their personality makes them experience this life-situation, and causes them to react to this, more intensely and with different conflicts and feelings than healthy individuals.

(4) During periods of these sustained emotional conflicts, the blood pressure in hypertensive patients is higher than during periods when they are more or less free from conflicts or during emotional conflicts of a different kind.

In this connection it seems fruitful to define more exactly the terms used in these hypotheses. Under *personality* we understand the integrated totality of experiences, attitudes, and behaviour patterns, whether conscious or subconscious, inborn and

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acquired, of the individual. *Traits* are the elements of the personality; they are abstractions, deduced from the study of the behaviour of the individual (including his verbalizations) in certain situations, both as communicated by himself or by others and as observed "objectively" by the investigator. An *emotional conflict* is a condition of the individual, usually following frustration(s) in his interhuman communication, characterized by a discrepancy between his personality and the possibilities, allowed by his environment and former experiences, to obtain gratification by acting out according to his personality.

It is the purpose of this paper to report on a series of experiments which were carried out by the use of the physiological method, as used by WOLF and WOLFF (1951) and their associates, REISER *et al.* (1951a, b) MOSES *et al.* (1956) and by HAMBLING (1952). The results of these experiments will then be reviewed in the light of these hypotheses.

METHODS

The material upon which this paper is based consists of about 250 "continuous" blood-pressure recordings, made during interviews or, occasionally, during other test situations. In another 600 experiments the pressure was taken at the beginning and the end of an interview. The data originate from twenty-nine persons: three healthy subjects, fifteen patients with benign or malignant hypertension, and eleven patients with other diseases, three of them with effort syndrome. The blood pressure of some of these patients was followed for 1–5 years during weekly or monthly visits to the clinic. Their life history was obtained by the method of the "biographical anamnesis" (GROEN *et al.*, 1950; GROEN, 1957).

The blood pressure was measured by the usual sphygmanometric method; during the "continuous" recordings this was done at intervals of 1–5 min. In almost all experiments the patients were seated in an easy-chair in the laboratory.

RESULTS

A temporary rise in blood pressure may occur in normal individuals as well as in patients with or without essential hypertension on many occasions.

When evaluating a blood-pressure recording, the well-known influence of the test situation and certain test procedures should be taken into account:

Fig. 1 gives an observation in a 36-year-old woman with vague abdominal symptoms after a partial gastrectomy. The blood pressure was recorded, together with other parameters, during a provocation test for the presence of a dumping syndrome. During a short initial period the blood pressure was 120/70. After 7 min some questions were asked while a doctor went out to fetch a glass of hot milk. The drinking of the milk 10 min later did not elicit any dumping symptoms, but it caused a rise in blood pressure from 125/80 to 150/95. Later the patient told how she loathed these experiments. She felt that doctors had ill-treated her by taking away her stomach but not her symptoms, and were now using her as a guinea-pig.

Fig. 2 shows an observation on a 20-year-old girl with marked hypertension during a series of tests to study the influence of hypotensive drugs. During the first 8 min her pressure fell, while

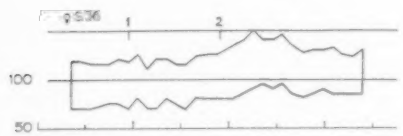

FIG. 1.—A rise in blood pressure induced by the test situation. 36-year-old woman with partial gastrectomy. 1: Beginning of preparations. 2: Drinking of milk. (In all charts time is in 5-min intervals.)

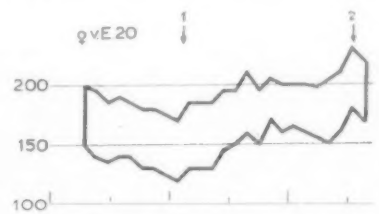

FIG. 2.—A rise in blood pressure during the preparations for an injection. 20-year-old hypertensive woman. 1: Beginning of preparations. 2: Injection

nothing special happened. Then one of the investigators started to prepare an injection; during this period the pressure rose from 170/120 to 200/150. With the *announcement* of the injection the pressure began to rise further, up to 230/180. After the injection was given, the pressure started to fall to the former level. This suggested an immediate hypotensive influence of the subcutaneously administered 25 mg of hexamethoniumiodide; however, three days before, an injection of salt solution had caused a similar change.

Fig. 3 is a reproduction of the results obtained in a 27-year-old married woman, also with essential hypertension. After a period of silence, preparations were made for the cold-pressor test. In 2 min the pressure rose from 180/150 to 210/155. During a 1 min submersion of the hand in ice-water the rise continued to 230/165. However, it is difficult to differentiate the reason for the phenomenon

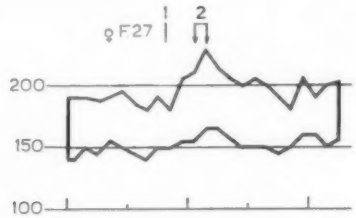

FIG. 3.—A rise in blood pressure before and during the cold-pressor test. 27-year-old hypertensive woman. 1: Beginning of preparations. 2: Cold-pressor test.

between the "somatic" influence of the low temperature and the psychological influence (WOLF *et al.*, 1955) of what was experienced by another patient as "a trick, resembling the methods of the German secret police."

Fig. 4 is another example of the influence of the test situation on the results; A 33-year-old married woman with a malignant hypertension was told that the senior physician would have a talk with her to decide what therapeutic steps were to be taken. During a 12 min resting period her

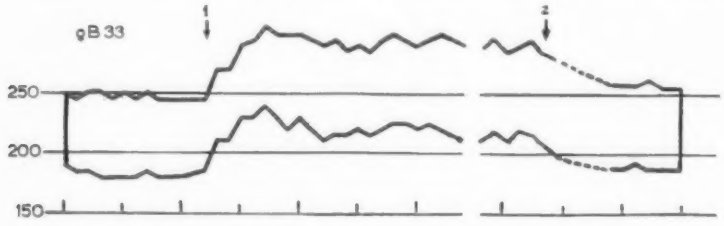

FIG. 4.—A rise in blood pressure induced by an announced final interview. 33-year-old woman with malignant hypertension. 1: Entrance of the senior physician and beginning of the interview. 2: Departure of the senior physician.

blood pressure stayed round 250/180. When the senior physician entered the room and started the interview the pressure rose within 5 min to 300/240. Although the interview touched on subjects of only little emotional content and at times was even aimed at giving reassurance, the pressure showed a marked fall only when, at the end of the interview, the physician left the room.

These were examples of the effects of the laboratory situation on the arterial blood pressure. The following observations illustrate the effect of certain topics of an interview.

Fig. 5 refers to a standard interview as described elsewhere (VAN DER VALK and GROEN, 1950) with a 26-year-old male student suffering from effort syndrome. After a 10 min silence, some questions were asked (name, age, study) without much change in blood pressure. Sixteen minutes after the beginning of the recording, the patient was asked whether his parents were still alive. The answer was:

"Yes, they are, I live with them." At that moment the blood pressure rose from 140/95 to 160/105. The psychiatric interview revealed that his problems were centred around a conflict situation with his parents.

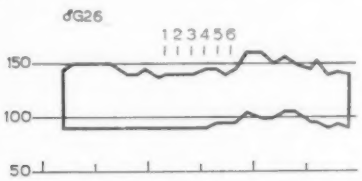

FIG. 5.—A rise in blood pressure induced by a certain question. 26-year-old student with effort syndrome. 1–6. Questions, asked by the observer. 1: Name? 2: Age? 3: Faculty? 4: Semester? 5: Complaints? 6: Are your parents still alive?—Yes, I live with them.

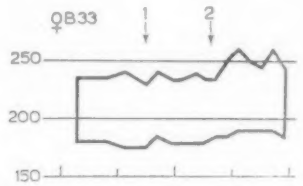

FIG. 6.—A rise in blood pressure during an interview. Same patient as Fig. 4. 1: Beginning of interview. 2: Inquiry on the situation at home.

Fig. 6 shows part of an interview with the same female patient as in Fig. 4. After 7 min, questions were asked; in the thirteenth minute the observer asked: "What is your husband's job?"—"He is a carpenter."—"Does he work for himself?"—"Yes, he has a workshop at home."—"Do you help him in the shop?"—"No, he does not allow me. His father helps him; he lives with us." During this part of the conversation the blood pressure rose from 235/180 to 260/190.

Fig. 7 records a more complicated experiment. The recording was made during a 2 hour investigation on a 54-year-old ship-load inspector with essential hypertension. After 10 min of silence he was ordered to make a fist. The blood pressure fell to 155/115, the lowest pressure registered during the session. A set of standard questions made the pressure rise again. After a more neutral interval (not in the figure) a 1-min cold-pressor test caused a short rise to 200/140. Six minutes later an interview

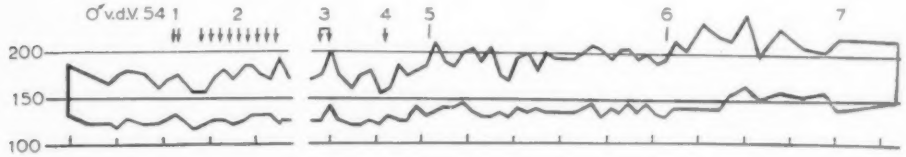

FIG. 7.—Changes in blood pressure during an investigation of long duration. 54-year-old hypertensive man. 1: The making of a fist. 2: Set of "standard" questions. 3: Cold-pressor test. 4: Beginning of interview about the work situation. 5: The patient tells of his feelings of rejection. 6: The physician proposes to have an interview with the employer. 7: Crying spell.

about his work was started. Again 5 min later he told about his job and his feelings of rejection. "It is all past now. I never gave vent to my feelings. I worked for 34 years with the same firm. I did the best I could. Now they are trying to put me out. I wish I would never have to go back there." After 25 min the physician proposed that he should speak to the patient's employer about the possibility of a change in his position or an early retirement. There was a strong emotional reaction. "Oh no, no, no! That is impossible! He is much too high to discuss these problems. If it could be settled, it would be too beautiful! But what would he say? He should never know what I've told you!" (Repressed tears.) The blood pressure rose to 245/160. There followed an emotional outburst ending in a crying spell. "What I'm doing? I'm getting crazy. That wretched job!"

Fig. 8 concerning the same patient, illustrates that these results are reproducible, when the same topic is dealt with during the recording. The record was made one month after that shown in Fig. 7. First the patient had to tell the physician that his daughter, who had applied for a job as a laboratory technician at the hospital, could not take the position because her husband objected. The patient was very ashamed about this awkward situation, and as he told this his pressure increased from 175/120 to 210/140. At that moment the investigator explained that the whole matter was all right as far as he was concerned, as his only purpose was to help the patient; he further said that he had had an

interview with the patient's wife, who had expressed her devotion towards the patient and her understanding of his problems. The pressure came down again to 180/115. Following this, the physician told the patient that he had paid a visit to his employer (an announcement which upset the patient) and that this director had voiced his sympathy with the patient and had said that he appreciated him as one of his best workers. "This is not possible!" exclaimed the patient, and he started to cry; his blood pressure at that moment was 220/155. During the further explanation of the director's willingness to take every step necessary for the patient's well-being, the pressure decreased to 190/125.

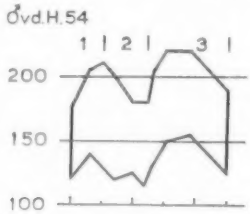

FIG. 8.—Changes in blood pressure with different topics during the interview. Same patient as Fig. 7. 1: The patient has to tell the physician that his daughter refuses the offered position. 2: The physician assures the patient that he does not mind and that in an interview the patient's wife expressed her devotion towards her husband. 3: The physician tells the patient that he paid a visit to the patient's employer and that the latter expressed his sympathy.

Fig. 9 relates to the same woman as in Fig. 3. Three minutes after the beginning of the recording the psychiatrist came in. Six minutes later he started the interview by telling the patient that he had had a conversation with her husband. The psychiatrist said: "I told him bluntly that I knew that he beats you regularly and that I have seen the bruises." "What did he answer?" the patient asked. "He explained the bruises by a fall."—"Oh, he will never forgive me for telling you!" the patient exclaimed. "I'm afraid to go home!" Within 6 min her blood pressure rose from 200/145 to 230/185. About 20 min later she began to cry softly and admitted that there was still something else, which she

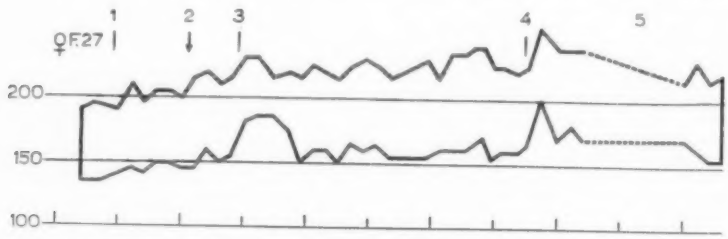

FIG. 9.—Changes in blood pressure during an interview with the psychiatrist. Same patient as Fig. 3. 1: The psychiatrist comes in. 2: Beginning of the interview. The psychiatrist tells of his talk with patient's sadistic husband. 3: The patient exclaims that she is afraid to go home. 4: She has something else to confess, but does not dare to in the presence of the observer. 5: Absence of the observer.

was unable to tell; there was a short elevation of the blood pressure to 255/200 (!). She then asked if she could be left alone with the psychiatrist, and during the absence of the observer she told him of her sexual experiences over which she felt guilty. At the end of the recording her pressure was 220/155.

Fig. 10 records the blood pressure during an interview with a 30-year-old warehouse clerk of low intelligence. He was rather silent during the first minutes of the interview, but then told reluctantly of a fight he had had with his father. The docile young man attacked his father, to his own surprise and fright, when the latter came home drunk and tried to smash the radio that the son had bought for his parents. He was furious over the behaviour, drunkenness, and ingratitude of his father and shocked by his own aggressiveness, for which he held his father responsible. The blood pressure rose from 140/90 to 190/110.

From our experiments referring to the fourth hypothesis, viz. that the blood

pressure in patients with essential hypertension is higher during periods of sustained emotional conflicts of a certain type, we give two examples:

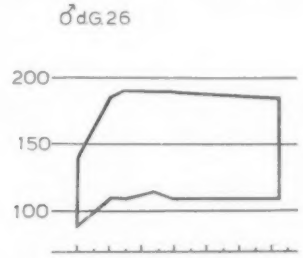

FIG. 10.—A marked rise in blood pressure when a 26-year-old man tells of a fight with his drunken father.

A 50-year-old female unmarried secretary developed an intimate relationship with her married employer, an egocentric figure. On the whole she was fairly satisfied in this situation. He depended largely upon her and she took over a great part of the managing of the business. She always told her friend to avoid a divorce and to take proper care of his wife and children.

Emotional difficulties arose, however, when he began to take an interest in younger women and sometimes even talked to her about his adventures and his plans to divorce his wife in favour of one of these girls. During this period hypertension developed, with complaints about headaches, dizziness, and forgetfulness.

Fig. 11 shows the blood-pressure recordings of this patient during five interviews.

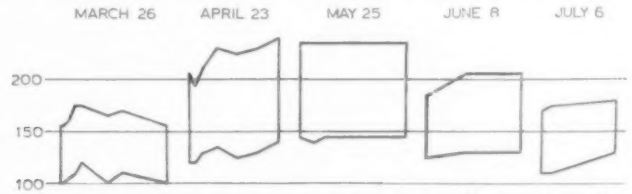

FIG. 11.—Blood-pressure readings during five successive monthly interviews. 50-year-old unmarried hypertensive woman, who had an intimate relation with her employer. High blood pressure during periods of sustained rage over his relation with another girl.

In the first interview, 26 March, she described the situation with her friend as improving. He had been nice to her and comforted her by saying that he really cared for her. Together they bought a new car (mean b.p. 165/105.)

In the second session, four weeks later, she spoke of how she felt injured, of her strong self-control, her tendency to hide her feelings, and her fear for her inward rage when she even thought of the possibility that he would tell her that he was indeed going to have a divorce and marry someone else (mean b.p. 215/130.)

In the third interview, 25 May, she spoke of her sustained rage over his behaviour and her plans to look for another job. "I am more hurt than sad," she said (mean b.p. 230/145.)

In the fourth interview she said that the situation was again improving (8 June). "The tension is broken. He shows more interest. I will await events before making a decision" (mean b.p. 200/130.)

During the fifth interview on 6 July, she said that her somatic symptoms had gone, although she felt tired. "The situation is rather neutral. He means little to me now, but it is all over with the girl" (mean b.p. 175/115).

The life history of this patient revealed that the relation with the friend had much in common with her childhood situation, when she made herself the devoted servant of her egocentric older brother in an attempt to attract his love and attention. In the relation with the friend she was happy with the situation as long as he needed her, but she developed a high blood pressure during periods of suppressed rage over his lack of interest, combined with feelings of jealousy of the younger girl.

Fig. 12 shows the blood-pressure values at the beginning, or at the beginning and the end, of a

series of interviews in the course of five months. (Although they were partly summer months, there was no noticeable influence of the weather on the blood-pressure changes.)

The recordings were made during the follow-up study of the same patient as in Figs. 7 and 8 and the main emotional problems were the same as described before.

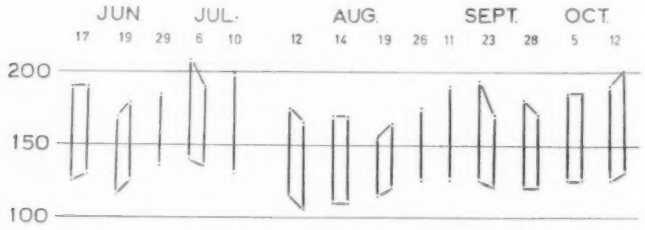

FIG. 12.—Blood pressure values at the beginning or at the beginning and the end of a series of interviews in the course of 5 months. Same patient as Figs. 7 and 8. Higher blood pressure during periods when the patient is insecure about the arrangement of his early retirement and about his relation to the physician. Lower blood pressure when the physician is back from a vacation.

During the interview of 17 June the patient said that he had been rather tense since the former interview because he supposed he had offended the physician. On the 17th the physician assured him once more that he was allowed to speak out freely and that he could depend on the doctor under all circumstances. On the 19th the patient said that he felt relieved and then brought up again the problem of his early retirement. On a short visit at the 29th he did not dare to speak of this again. On 6 July he spoke of how it had kept his mind busy and that he had wanted to see his director about it, but did not dare to do so without consultation. The physician told him that he would take up the matter again with the firm, but that it was better to postpone it until the end of the summer. The patient was relieved, apart from the approaching vacation of the physician.

On 12 August he explained with tears how much he had missed "his own" doctor. Now he felt much better. Towards the end of the month he began to speak again of the coming interview with the director, the outcome of which was told him on 23 September. He was satisfied with the arrangements for a pension, but had hoped that the director would have taken a more personal interest in him. During the next weeks he was progressively worried because no answer was received from the director about the possibility of a small easy job to help him financially when he would have his pension.

The chart shows that the blood pressure was higher during periods when the patient was tense over problems concerning his relation to the director or the physician than during periods when he was more relieved.

(The objection could be made that there is no proof that a higher blood pressure during a visit to the hospital means that the hypertension was actually worse during the period in between the visits. This, however, is a difficulty inherent with every investigation over a long range about arterial hypertension. Even the diagnosis of persistent hypertension is made when a high blood pressure is found when measuring it, although, strictly speaking, nothing is known about the height of the blood pressure between the measurements.)

DISCUSSION

These findings will best be understood in the light of the first hypothesis, viz.:

Certain personality traits predispose certain individuals to sustained hypertension because they predispose them to certain emotional conflicts.

For this purpose it is necessary to describe briefly the common experiences that were found to occur in the life-history of our patients with essential hypertension, as obtained by the method of biographical anamnesis. From these common experiences and the observation of the attitudes and behaviour of the patients in later life, the following formulation can be offered as characteristic for patients with this condition.

This description is for the major part based on the work of GROEN and REISEL (1948) but incorporates our own observations.

During childhood the patient had difficulties in meeting the demands of one or both of the parents. Usually these are described as exemplary but stern, loving the children but showing their affection but rarely, and in general requiring, above all, exemplary behaviour. The patients as children were taught at an early age to fulfil their duty, especially towards their elders. In their behaviour they were early taught to control themselves. Training to toilet habits and cleanliness took place along the same lines.

By meeting the demands of their exacting parent figure(s), the patients during their childhood tried to obtain from them the love and attention they needed. But because the parents were severe and gave praise and love only when high requirements were fulfilled, the patients never succeeded in capturing the parental love completely. This introduced in their personality an insecurity, a fear of never having done enough to be assured of the emotional attachment of the parent. (In some cases this seems to have been reinforced by frequent absence of the father.) Objectively the demands of the parents in many of our cases may not have been too different from those of other parents, but for the patients in their childhood the meeting of these demands became of major importance, partly because this was the *only* way to obtain the parent's love, partly perhaps because of a certain predisposition to a rigid conditioning in early youth, leading to compulsive behaviour. Often these patients spoke of having been jealous because—notwithstanding their efforts at dutiful, exemplary behaviour—a sibling got more parental attention than they themselves. To this they would react by strong feelings of rage from being unjustly treated.

(This reaction to the parental preference for a brother or sister may be an important factor in the development of the personality, because we have only rarely found a hypertensive patient who was an only child.)

Any acting out or verbalization of the feelings of aggression which the patients experienced towards parent(s) or siblings, however, were strongly suppressed by the parents' rejection of the child so soon as it showed these feelings. Later the patients themselves controlled their behaviour, partly by a strong conscious effort of the own conscience, into which the exemplary behaviour of the parents was now incorporated, partly by an obvious fear of losing the affection of key figures like parents, siblings, marriage partners, relatives, or their own children. One of our patients expressed it like this: "I always live in *fear* not to be accepted; when I believe that I am not accepted I become very *angry*, but then I am *ashamed* of myself."

In adult life these patients, still feeling insecure about the love of the key figures in their environment, try to obtain this love by the same dutiful-righteous behaviour which was taught them in their youth. By working hard, by acquiring a trusted and respected position, they expect now to obtain and keep the love and esteem especially of relatives and authorities but sometimes of every person they meet. (For married women this often means: to drive their husband to acquire such a position.) They want their marriage partner and children to live in accordance with their own dutiful exemplary pattern, and if they refuse to do so, these patients react by the same feelings of aggression, which, however, are equally inhibited by conscience and fear of being rejected. Their moral standards are of the same rigid pattern and they expect that others will also live according to these standards (STORMENT, 1951). Love and

affection are judged by the fulfilment of these requirements. Therefore, in their interhuman contact small things like giving or receiving a present, the keeping of a promise or an appointment, play an important role, but also valuable social traits such as honesty and sincerity. They may openly show their hostility over neglect of such points when the person concerned is of little importance to them, but they do not dare to show their feelings when these concern a key figure, and this ambivalence often leads to suppressed rage.

Every new relation with an authoritative figure means a new challenge: "Will he accept me if I behave in such an exemplary way as I always try to do?"

Similar attitudes and behaviour patterns govern their sexual development. Sexual desires are mostly strongly suppressed in childhood. Because of this, many of our female hypertensive patients were frigid. On the other hand, sexual relations give them the possibility of feeling themselves accepted; often they cannot resist anyone who is nice to them and entangles them in a love affair. Among our patients with essential hypertension there were relatively more than among our patients with other diseases who were promiscuous, or had at least had one extra-marital experience, or who had strong fantasies in that direction. This brought them in conflict with their feelings of duty and gave rise to feelings of guilt. These feelings of guilt, together with the moderateness of their sexual urges and on the other hand the wish to be loved and accepted, often lead to an ambivalence in sexual relations.

In this connection it is interesting to note that often in these patients there are exhibitionistic tendencies connected with feelings of shame, which may be responsible for the characteristic blushing which hypertensive patients show so commonly at the face and the neck during interviews or at the neck and the thorax when they undress to be examined.

It can easily be understood that the doctor-patient relationship of hypertensive patients is strongly influenced by their personality and acquires a special meaning, a fact mentioned by several authors (LOWRY, 1951; REISER *et al.*, 1951; SHAPIRO *et al.*, 1951). When for example the patient has to wait for the doctor (he himself being always very punctual so that the doctor should not criticize him) he becomes inwardly angry, because it means to the patient that, in spite of his exemplary behavior, he is not accepted by the doctor. The patient may want to go away: "If the doctor is not coming now, I don't want him any more." But if he really goes, he feels remorse because he has now lost the doctor's affection completely.

In this description is entered the characteristic *combination* of antagonistic feelings of love and aggression, anxiety and rage, hostility and fear, all directed to the same key-person (parent, marriage partner, authority, relative, or child) which has been mentioned by almost all authors who have studied the personality and conflict situations in patients with hypertension. GROEN and REISEL (1948) have pointed out that these ambivalent feelings are mutually inhibitory and that this explains the absence of overt acting out, in spite of the great intensity of the feelings, especially during exacerbations of the emotional conflicts.

The nature of these conflicts has also been described by REISER, ROSENBAUM, and FERRIS (1951), who distinguished three main types:

A. Dependence and hostility in relation to parental figures.
B. Hostility toward siblings.
C. Fear, hostility, and guilt in sexual relations.

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We wish to add that these feelings become the more intensified because the patients have this strong self-control and therefore inhibit any abreaction (SASLOW *et al.*, 1950; GROEN 1951; VAN DER VALK 1950; WEISS 1951; MOSES *et al.*, 1956.) (The influence of this on the blood pressure in dogs was noted by WILHEMJ *et al.*, (1953).) When we review the results of our experiments in the light of these descriptions, it can be seen that the situations in the first four experiments gave rise to the following ambivalent feelings: a combination of fear, hostility, and dependence towards a father-like figure. This is the feeling-state, described under letter A. We also note that there was in none of the experiments any *abreaction*, nor any outward expression of the feelings.

During the periods with a marked rise of blood pressure in the experiments 5–10 the feelings were the following:

No. 5: Ambivalence towards the parents.

No. 6: Feelings of rejection by husband and father-in-law, at least as far as work is concerned.

No. 7: Feelings of rejection by the employer, coupled with sibling rivalry towards co-workers.

No. 8: Fear of rejection by the doctor through the behaviour of the daughter and fear of the result of an interview with an authoritative employer, whereas a decrease in pressure followed the assurance about the feelings of sympathy of the physician, wife, and employer.

No. 9: Feelings of anxiety and hostility over the outcome of an interview with a sadistic husband. Fear of his resentment and revenge. Shame and guilt when having to confess sexual excesses.

No. 10: Hostility towards the father.

All these feelings correlate with those described under A, B, and C.

Up to now we have considered the behaviour of the blood pressure, without differentiation between the systolic and diastolic pressure. Usually these two fluctuate in the same direction, but this is not always the case. HAMBLING (1952) is of the opinion that the diastolic pressure—being the result of the vasoconstriction—is of more importance as an expression of the emotional state than the systolic pressure, which is dependent largely on the cardiac output. Publications from HAMBLING (1952), MOSES *et al.* (1956), SCHACHTER (1957), and WOLF and WOLFF (1951) give the impression that there is a difference in the kind of emotions that are related to changes in systolic and those related to changes in diastolic pressure.

For a more exact description of the emotional conflict situations connected with our four hypotheses we must therefore pay special attention to discrepancies in reaction between the systolic and the diastolic pressure that took place in our experiments.

These discrepancies can be in two directions, which can result in either an increase or a reduction of the pulse pressure.

An increase of pulse pressure was observed at the end of Fig. 7 and during the last minutes of Fig. 9, when the tension of the interview was broken which even ended in a crying spell. In Fig. 10 the increase in the pulse pressure during the first 15 min is greater than could be expected from the rise in blood pressure. This was when the young man began to talk freely about the fight with his father.

On the whole, we have seen this divergence between systolic and diastolic pressure

at moments when the subject was active, became more relaxed, wept, or when he was openly aggressive.

Reduction of the pulse pressure, that is to say a convergence of the systolic and diastolic pressure, is seen in Fig. 9 in two places. First, after the psychiatrist had told the patient of the interview he had had with her husband, whereupon the patient expressed her fear of his reaction to this. Although the systolic pressure increased, the rise of the diastolic pressure was still greater. The second time this took place near the end of the interview, when the patient told that she had something more to say, but did not dare to do so in the presence of the observer.

In Figs. 13, 14, 15, and 16 we give a few fragments of records in which the systolic pressure decreased while the diastolic pressure increased. This phenomenon happened

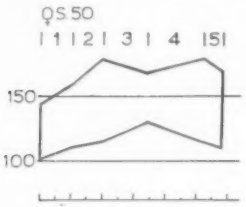
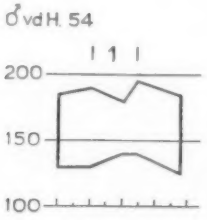


FIG. 13.—Convergence of the systolic and diastolic pressure during an interview. Same patient as Fig. 11. 1: Lack of contact with friend. 2: Hostility in dreams. 3: Frightening dream. Felt trapped. Loss of self-confidence. 4: Criticizes friend. 5: "He is so dull."

FIG. 14.—Convergence of the systolic and diastolic pressure during a part of an interview. Same patient as Figs. 7, 8, and 12. 1: "My wife said I have been put aside all my life. It is not nice to hear."



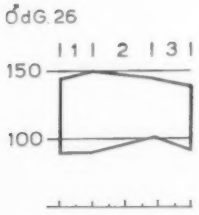


FIG. 15.—Convergence of the systolic and diastolic pressure during an interview. Same patient as Fig. 10. 1: Does not want to talk about politics. 2: Sex. 3: Impotence.

during moments of the interview when the patient told of his anxiety, disappointment, and lack of self-confidence.

When we presume that the rise in blood pressure (systolic and diastolic) is connected with a complex of antagonizing emotions, viz. hostility and fear, aggression and anxiety, rejection and dependency, we might postulate that the *diastolic* pressure increases more than the systolic pressure in situations where the *fear* and *anxiety* are more prominent than hostility and aggression, whereas the increase of the *systolic* pressure is greater than that of the diastolic pressure in situations where the *hostility* and *aggression* are stronger than feelings of fear and anxiety.

This assumption, however, is not in complete accordance with the findings of MOSES (1956) and SCHACHTER (1957), and as the evidence is only scanty it seems to us to be, at the present stage of our knowledge, of secondary importance, compared to

the support which the hypotheses, formulated in the introduction of this paper, have now received from many sides. Specifically our results, confirming those of WOLF and WOLFF (1951), WOLF *et al.* (1955), HAMBLING (1952), and MOSES *et al.* (1956), may illustrate that techniques comparable to those used in modern clinical science can and should be applied to the study of so-called psychosomatic phenomena, where they

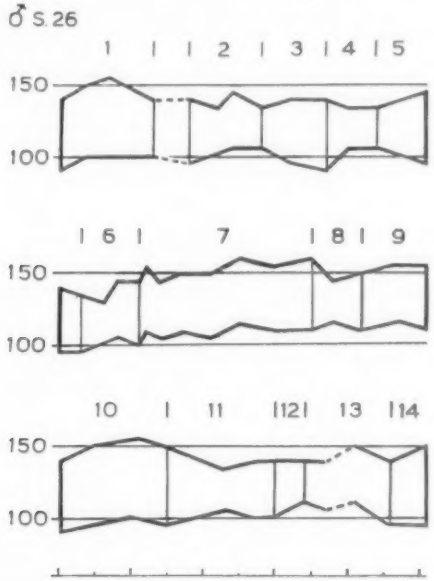


FIG. 16.—Convergence of the systolic and diastolic pressure on several occasions during three interviews. 26-year-old student with effort syndrome. 1: Relation towards father. 2: Children's fears. 3: Schools. 4: Failed for examination. 5: Questions about investigation. 6: No member of fraternity. 7: Sex. 8: Homo-erotism. 9: Girls. 10: Investigation. 11: Nudeness is beautiful but frightening. 12: Dependence on mother. 13: Relation towards mother. 14: Family.

offer valuable possibilities to support or reject psychiatric hypotheses. It is realized that the psychosomatic concept of the aetiology of essential hypertension cannot be considered proven as yet (BINGER, 1951). But with ever sharper formulation of the hypotheses and pertinent observation and experimentation, the concept is beginning to lose its metaphysical character and can already be considered as a fruitful working hypothesis.

SUMMARY

The author formulates the hypotheses on which the present psychosomatic concept of the aetiology of essential hypertension is based. He describes the personality structure and the nature of the emotional conflicts that are postulated to play a role in the pathogenesis of this condition. These hypotheses were supported by the results of an investigation into the behaviour of the blood pressure in hypertensive patients and control subjects, who were exposed to experimentally reproducible stimuli in the laboratory, mostly during interviews concerning their actual or former life situations.

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BOOK REVIEWS

La Psychanalyse d'Aujourd'hui (Ouvrage publié sous la direction de S. NACHT) Presses Universitaires de France, Paris, 1956. 2 vols. viii, 867 pp. 2800 Fr.

IN his introduction to these volumes, Dr. ERNEST JONES mentions some of the reasons why psychoanalysis in France has undergone certain vicissitudes and has had a somewhat chequered career. The linguistic difficulties, and the French mode of thought, clear, logical and consistent, militated against this new and very disturbing approach. Nor did the upheavals of the two wars make for stability. It is reassuring therefore to see that French psychoanalysts, in this collection of essays on psychoanalysis to-day, write with confidence and a scholarly knowledge, of their experiences in a wide range of human disorders. How refreshing, too, is the French contribution to original work in this field—there is little that is stereotyped or hackneyed about most of the essays, something that cannot always be claimed for similar publications in the English language.

The authors range widely—beginning with a consideration of the indications and contra-indications for psychoanalysis in adults by Dr. NACHT, we pass through an account of clinical psychoanalysis by BOUVET, psycho-analytic therapy by NACHT, to considerations of infancy, adolesence, education, sexual disorder, and conclude the first volume with an excellent essay by R. HELD on psychoanalysis and medicine.

The second volume deals with psychoanalysis and neurobiology, psychosomatic medicine, and a variety of other topics. Of many excellent articles, perhaps the most outstanding is that by RACAMIER, on psychoanalytic therapy in the psychoses. This is a most valuable contribution, with a good bibliography, and should be read by all psychiatrists who have to treat psychotic patients. BOUVET's paper also breaks fresh ground, and is a thoughtful and stimulating piece of writing. PIERRE MARTY and MICHEL FAIN deal with psychosomatic medicine from the standpoint of psychoanalysis, and give a lucid account of the present position of psychoanalytic thought in this field. Even if there is a certain monotony, and indeed rigidity, in these views, they have a historical value. The time has come either to confirm or deny some of the suppositions put forward in such abundance, using methods less subject to personal bias than the analytic.

All in all, these two volumes demonstrate that French psychoanalysts have important contributions to make. The annoyance of uncut pages so usual in many French books mars the pleasure of the reader.

DENIS LEIGH

HYMAN MILLER and DOROTHY W. BARUCH: **The Practice of Psychosomatic Medicine as Illustrated in Allergy.** The Blakiston Division, McGraw-Hill Book Co. Inc., New York, 1956. Pp. 196. $5.00, 37s. 6d.

THE allergist who becomes interested in the psychiatric aspects of his specialty is liable to be viewed with suspicion, both by his fellow allergists and by the psychiatrist. Psychiatry alone demands a long and rigorous training, whilst the ramifications of allergy—botanical, immunological, and endocrinological to mention only three, demand an extraordinarily wide range of knowledge. This book, the work of a practising allergist and a psychoanalytically oriented psychologist, is therefore welcome as an example of the necessary teamwork which is so essential in this difficult subject.

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MILLER and BARUCH have worked fruitfully in collaboration for many years, and their researches are well known. They have now presented their interpretation of the psychosomatic approach in allergy to a wider audience. The book is chiefly directed to the physician primarily responsible for the care of the allergic patient—internists, paediatricians, dermatologists, general practitioners, and many others who come into contact with the allergic patient, and the language is carefully chosen for this purpose. The characteristically vivid style makes the book particularly enjoyable, and, for an Anglo-Saxon reader, evokes waves of nostalgia for the American scene. The pictures of the mother dragging a reluctant small boy into the consulting-room, saying to him "Stinky, you drive me crazy," or of the resuscitation squad of the Los Angeles Fire Department working on a woman in status asthmaticus, are authentic Americana. The book is read with interest to the end.

But what of its message, and the psychosomatic approach used? Psychoanalytic theory is the driving force, somewhat heterodox perhaps, but nonetheless whole-hearted. The allergic patient's universal fear is that his mother has never loved him—there is a fear of loss of the parent. The child attempts through fantasy to retrieve the love he feels he never had, develops overpowering hostility which he turns in on himself, and which finds expression in an allergic manifestation. There are five basic psychologic objectives—to deal with the patient's affect hunger, his fear of rejection, to help release his anger, to reduce his anxiety and guilt, and to help him grow in self-respect, security, and ego strength.

Symptoms are seen in the light of psychoanalytic theory—thus "in the majority of children with hay-fever the nose is important as an organ that in the anal period can 'take in' smells, and can in fantasy be adapted to 'take in' other things and people." In the phallic period, for instance, the nose becomes plugged up to hold in a penis. Similarly, fantasies of the nose being stuffed up with anal material are the most frequent fantasies observed in the allergic child with hay-fever, and so on.

This is all very well, but is it legitimate to present this to the wide audience for which the book is intended? Certainly in this country such views will be received unfavourably by allergists and physicians, and will confirm the prejudices they already feel toward the psychiatrist. In the United States it may be different. The pity is that so much excellent advice is contained in the book. The general principles of dealing with children, the chapter on treatment principles applied to child patient and parent, the attitudes towards medication—all these are excellently handled with great competence. But the book remains largely local in its appeal—a very special product of the United States.

DENIS LEIGH

ARTHUR JORES: **Der Mensch und seine Krankheit.** Ernst Klett Verlag, Stuttgart, 1956. Pp. 173.

ARTHUR JORES is Professor of Internal Medicine at Hamburg University. In 1950 he became Rector of the University. What he has to say therefore is of some significance by virtue of his position. Let it be admitted that a non-German reader may be frightened by the title of the book, the sub-title *Grundlagen einer anthropologischen Medizin* in particular may make him ill at ease. It is a great relief therefore to find that the book is exceptional. Professor JORES succeeds, in 173 concentrated pages, in confining himself to the questions which have a bearing on man as a unique living being and what fundamentally separates him from every other species. He analyses the concept of body, soul, and body-soul unity as well as the man-environment entity, without which a deeper understanding of human nature is not possible.

Although man has to fulfil the basic tendency of all living, i.e. attainment of the highest possible degree of evolution and functional multiplicity, he has to do this with the help of his own choice. This means that for him a system of valuations turns out to be of the highest importance and allows for the possibility of failure.

With the specific human situation as a background, JORES is formulating what is fundamental for the understanding of specifically human diseases. These are the diseases which now tend to be of overwhelming importance and which have no etiology so far as medical text-books are concerned.

In accordance with MÜLLER, FRIEDERICHS, and Boss, the consequence for the author is a necessary re-orientation of medical thinking, which still remains on a mechanistic level incompatible with the understanding of the specifically human diseases which form a part of human living in its broadest anthropological sense. His task is obviously of the utmost importance.

In his elaborations JORES makes use of many philosophical and medical thoughts, which have been brought forward by others (EBERHARD, V. WEIZSÄCKER, BINSWANGER, and others), but he has been capable of digesting and bringing them together to a totality which carries his own signature.

Some of his elaborations may be criticized by many readers. Even so, it must be admitted that the content of this book is stimulating, thoughtful, and based on a wide knowledge. The author puts forward a strong case, and no one can read the book without being deeply impressed. The style is simple and sharply defined. The tendency, not unknown in German authors, to express simple things in a complicated way, has been carefully avoided. The result is excellent, and Professor JORES can be congratulated on the pithy way he has managed to deal with the difficult and abstruse problems of mankind and its diseases.

GERDT WRETMARK

DON CARLOS PEETE, M.D.; **The psychosomatic genesis of coronary artery disease**. Charles C. Thomas, Springfield, Illinois, 1955. Pp. 220. $7.75.

THE introduction to this book contains the following statement: "The theme of this publication is to show the relationship between insecurity (in the larger sense), and vasospastic disease manifested by its effect upon the heart, namely: coronary sclerosis and complicating coronary thrombosis. At the outset it is well to emphasize that psychosomatic illness is the symptomatic expression of disturbed blood supply to a specific organ. In the beginning, the symptoms of the illness are the result of arterial or capillary spasm resulting in ischaemia locally. This continual over-spasm finally leads to degeneration of the vascular system as shown by hypertrophy of the media and thickening of the internal wall of the arterioles and arteries. It is believed that heredity determines the tissue or organ that will be most likely to show the effect of stress resulting from insecurity."

From this the reader will gather that a theory of the aetiology of coronary artery disease is here propounded, which in fact is neither new on the one hand, nor established on the other. The question of whether or not spasm of the coronary vessels actually occurs at all or whether if it does occur it plays any significant part whatever in the genesis of coronary arteriosclerosis, has still not been settled, and nothing that is written in this book will make any appreciable contribution to its settlement one way or the other. Regarded therefore as an essay with an original point of view, this one stumbles at the beginning and finally falls flat because the author can report no new work by himself or anybody else in support of his thesis.

However an alternative, more charitable and therefore more rewarding, way of approaching this book would be to regard it as the leisurely discursive essay of a kindly, modest, and sincerely religious physician, who has used his spare time to browse among the library of his home university, to dwell upon the idiosyncrasies of mankind in general (and in particular upon that section of it whose daily life he observed in his home town) and to come up with a historical treatise, well documented and carefully presented, bearing on the general relationship between life stress and bodily disease with particular reference to angina and coronary thrombosis. Accepted on this basis, the book is readable, interesting, and brings together a number of sources of information about the pioneers in medicine, whose contributions to the physiology of arterial health and sickness remain outstanding and arresting. Erudite references to the life and work of GALEN, FABRICIUS, HARVEY, HEBERDEN, JENNER, and HUNTER, provide examples of the way in which the author has traced his subject through the pages of medical history. Later chapters pay similar attention to BELL, CLAUDE BERNARD, KROGH, ROUGET,

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CANNON, PAVLOV, OSLER, and HERRICK. The theme stated in the introduction, and referred to above, is patiently pursued, but inconsistently presented. For example, reference to the postulated functional spasm of coronary arteries is made sometimes by inference, sometimes by speculation, sometimes by unsupported statements, and sometimes (and perhaps more wisely) is omitted altogether. At no stage are the alternative theories about relative oxygen debt in cardiac muscle, temporarily paid by increased blood pressure, and ultimately causing a lethal load on already arteriosclerotic vessels, discussed or even mentioned. The author in fact seeks to draw a complete working analogy between the aetiology of Raynaud's disease, with its proven element of peripheral vascular spasm, and coronary disease, in which such spasm has never been finally proved or conclusively demonstrated.

Himself an internist, the author reveals a certain ignorance of psychopathology when digressing to express moderate disapproval of the work of Professor Sigmund Freud, which he contrasts unfavourably with his own interpretation of the Ten Commandments. His concluding observations on this score have a sententious flavour:

> "The misinterpretation of facts by Freud caused prolonged prejudice against psychiatrists from many sources, and again emphasises the importance of the proper interpretation of facts resulting from scientific investigation."

To which your reviewer can only dare to add that people who live in glass houses should watch their aim.

The book comes into the reader's hands embellished with a dust cover across which runs an enlarged reproduction of an electrocardiographic record, above and below which, in gothic characters are inscribed the following words:

> " 'The fear of the Lord . . . is the beginning of wisdom.' *Proverbs* 9 : 10."

This theme is repeated on the title page, and in fact every one of the six chapters is prefaced by an entire double page on which similar Biblical texts are reproduced in hand-drawn Gothic characters half an inch high. The one referred to above, heads Chapter I; Chapter II is embellished by "Ye shall know the Truth and the Truth shall make you free," and subsequent chapters are inspired by the themes: man shall not live by bread alone, whosoever shall save his life shall lose it, and the wages of sin is death. The sixth and final chapter, devoted to a somewhat dogmatic but otherwise unexceptional dissertation upon the modern treatment of coronary thrombosis, has for its caption "Come unto Me all ye that labour and are heavy laden, and I will give you rest."

To present a book in this way suggests either that the author regards its message as a revelation, or else that he is singularly insensitive, or just plain naive. After reading the book it would seem harsh simply to convict the author of the latter shortcomings; he emerges rather with the religious aura of a Methodist minister, village craftsman, or chapel-going trade union leader of a vanished day, when a man's interpretation of the gospels was welded to his daily work to give justification to every view he held. I would be the last to suggest that this blending of biblical devotion and observation of everyday life is in itself ground for criticism of any kind whatever. But it would take a better book than this to justify the dust cover and the chapter headings; and indeed even a masterpiece might founder in their wake.

By contrast, the strength and weakness of the author's simple and sincere point of view about the subject on which he writes is illustrated by this untouched quotation from the end of Chapter III:

> "It is my belief that the pathological changes are first produced in the capillary bed as in Raynaud's disease and *are the result of capillary spasm.* The degenerative changes in the arterial wall (coronary-sclerosis and coronary-thrombosis) are secondary changes *resulting from the long-continued capillary spasm.* Thus the stress factors produce hypertrophy of the vessel wall by increasing the pressure locally or systemically. The degenerative changes or sclerosis follow systemic changes in the vessel wall. Thrombosis finally results from the narrowed channel and the increased tendency towards coagulation of blood which follows the stimulation of the adrenal cortex in stress conditions.
>
> "The psycho-therapeutic value of the Bible, not only in preventing but also in curing mental illness, *has been shown by science* to be based upon sound observation. It may be likened in its value to many of the drugs and therapeutic procedures of the past which were used empirically and have since been found to be based on sound scientific fact. Thus, 'man cannot live by bread alone'." (Italics are the reviewer's.)

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The book is replete with quotations from original sources, taken from the manuscripts and published writings of the eminent historical figures to whom reference has been made. Moreover it is lavishly illustrated, and contains a number of diagrams designed by the author himself, some of which are neat and expressive, particularly in their illustration of the psychophysical mechanisms of the autonomic and endocrine activity; but at least one of which (p. 197) looks as if it has come straight out of the sketch book of a religious schizophrenic.

There are both wisdom and goodness in this book and it is not to be condemned. Could it but have avoided pretentiousness it would surely have gained in satisfaction for the reader what it might have seemed to the author to have lost in pride of achievement. It is in truth a work which would have been enriched and ennobled by such a sacrifice.

D. Stafford Clark

Walter H. v. Wyss: **Aufgaben und Grenzen der Psychosomatischen Medizin**. Springer-Verlag, Berlin—Göttingen—Heidelberg. 1955. Pp. 92.

This is a slender volume which contains brief, but informative, accounts of a wide range of psychosomatic theories. It serves up, so to speak, an appetizing variety of *hors d'oeuvre* with a minimum of critical spicing. It will suit the palates of many students and may whet their desires for more substantial fare.

The first section of the book is concerned with psychophysiology and deals with the problem of body-mind relations, with affectivity, and with the physiological concomitants of emotions. There are tasty morsels from many masters: Sherrington, Brain, Cannon, Fulton, Penfield, Masserman, W. R. Hess, v. Weizsäcker, Janet, and Sartre.

The second section of the book is clinical. It provides an interesting comparison of psychosomatic views in English and German literature. We encounter the familiar names of English and American authors: Dunbar, Weiss and English, Wolff, Alexander, Halliday, Grinker and Robbins, and others. Their views are often contradictory, but many of them agree in their aim to find general solutions and aetiological conformities. The result, the author says, is a certain monotony in regarding the same kinds of emotional conflicts as responsible for many psychosomatic disorders.

Among the German writers are mentioned v. Bergmann, v. Krehl, v. Weizsäcker, Mitscherlich, Buechner, Binswanger, and Boss. Many of them display a tendency, the author remarks critically, to apply psychoanalytic or existentialist theories indiscriminately to many disease forms even when the assumption of psychogenesis is hardly tenable. What about diseases in plants and animals? the author asks. What about deformities, inherited diseases, infections, tumours, etc.? And he concludes: "We must admit that we do not know how far mental events reach down into the sphere of the body; but as long as we do not know this—and we will hardly ever explore this fully—we should not claim too much."

Yet in spite of this warning the author indulges in some speculative fancies of his own which he regards as "more than a mere play with ideas." He feels that the regularities observed in physiological functions are essentially similar to the regularities encountered in mental functioning. For example, just as the blood stream is a mediator between the energy-providing substances of the environment and the body cells which need them, so is the stream of consciousness the mediator between the psychological forces in our environment and our inner mental life. Just as kidney functions are protective, so are intelligence and conscience. When either of these functions breaks down, destruction and chaos follow.

On the whole the book is balanced and sensible in its account of the most contradictory theories. The wildest flights of speculative claims are rejected in favour of attitudes which consider the soma as much as the psyche.

F. Kräupl Taylor

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Psychosomatic Aspects of Surgery. Edited by ALFRED J. CANTOR and ARTHUR N. FOXE. New York: Grune and Stratton: £2. 6s. pp. 220.

THE proceedings of the First Annual Meeting of the Academy of Psychosomatic Medicine, held in New York in 1954, are published in this volume. Papers were presented by representatives of most of the surgical specialties, and commentaries on each were given by psychiatrists and psychologists. The meeting concluded with a panel discussion of a more general nature.

The emphasis in most papers was somatopsychic rather than the reverse, the majority of authors considering the relationship between doctor and patient and the effect of various diseases and procedures upon the patient's behaviour and emotions. However, Dr. CANTOR's remark in his preface, that the surgeons were "oriented in psychosomatic medicine," may explain a number of statements that might be criticized by other surgeons not so orientated.

The report will enable a psychiatrist or psychologist who is unfamiliar with the multitude of surgical departments, to discover some of the psychosomatic problems that exist, and the common ground that lies between these fields. He will disagree with much that was said, and will find that some papers are more worthy of attention than others. Nevertheless many aspects of the subjects were reviewed, and in a group of papers on cardiovascular surgery the neuropsychiatric complications and associated conditions in 1500 cases were analysed, providing information that could usefully be obtained in other branches. A number of the many references given in the book are irrelevant, and your reviewer agrees with one of the speakers, "that nothing of a startling scientific nature appeared at this meeting."

PETER SCHURR

ANTONELLI F. and M. SECCIA: **Psiche e Tubercolosi.** Istituto di Medicina Sociale, Rome, 1956. Pp. 282. 1,500 lire.

THE introductory remarks of Professor Omodei-Zorini (director of the Institute C. Forlanini for TB in Rome) welcome this book as part of a new trend in psychosomatic research on patients suffering from tuberculosis. The publication of this work was supported by the Instituto di Medicina Sociale (Rome).

The two authors present their book in three parts. In the first there are four chapters dealing with general considerations upon the psychology of TB patients admitted to a TB sanatorium, psychological aspects of tuberculosis, "psychoreceptivity" to tuberculosis, psychopathogenesis of tuberculosis. The second part of the book includes a discussion on the value of some psychological tests (Zulliger; Banati-Fischer; Traube; Machower; Koch; and graphology) and a summary of the test results in ten illustrative cases.

There is no homogeneity in the selected cases as some of the patients had been admitted for a few months, others for years; some appear to be fresh cases, others had been for years in various TB sanatoria. There is no mention of the clinical outcome of any of the cases presented. The reproduction of patients' drawings is meant to illustrate various aspects of the psychology and psychopathology of TB patients. There is no evidence that the patients have been tested more than once during the long course of their illness.

The third part is formed by three chapters: Psychodynamics; the depression of the patient with TB; and "Psychosocial diergotherapy." The title of this chapter could be translated more simply in English as "occupational therapy" and is largely a complaint about the lack of facilities for occupational and re-educational therapy in TB sanatoria in Italy..

The style appears to vary according to the author of each chapter. The whole book is devoted to describing in dramatic psychological terms the unhappiness of patients suffering from TB. No comparison is attempted with results of psychological tests in patients with prolonged illnesses other than tuberculosis. Very little factual information is given throughout. A bibliography of five pages and an index are included in this volume of 282 pages.

G. PAMPIGLIONE

N. O'Conner and J. Tizard: **The Social Problem of Mental Deficiency**. 1956: Pergamon Press, London and New York. 182 pp., 30s.

This is an important book and will be read by everyone concerned with the problems of mental deficiency. For readers of this journal the book can also be read with profit as an example of how investigations should be conducted, and also for the information it supplies of particular relevance to our field. The validity and usefulness of the psychosomatic approach is strikingly vindicated in the results of this new, and fruitful approach to mental deficiency.

Denis Leigh

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J. Psychosomatic Res., 1957, Vol. 2, pp. 157 to 171. Pergamon Press Ltd., London

GROUP PSYCHOTHERAPY IN BRONCHIAL ASTHMA

A. BALFOUR SCLARE, M.B.* AND J. A. CROCKET, M.D.†

IN his classic monograph on bronchial asthma SALTER (1860) commented that the condition is peculiarly intractable and that treatment is essentially palliative. This statement cannot be much modified even today, though our fundamental knowledge of asthma is increasing and the way is being paved for therapeutic advances. The aetiological role of emotional factors is being more widely acknowledged, and DEKKER and GROEN (1956) have demonstrated and measured the influence of emotional factors in asthmatic patients under controlled laboratory conditions. If it be accepted that psychic disturbance may play a significant role in asthma, then psychotherapy becomes a rationally based treatment. Individual psychotherapy has been undertaken by various workers (DUNBAR, 1938; FRENCH and ALEXANDER, 1941; O'NEILL, 1952); such an approach is causally directed and the total personality becomes the point of attack. Opinion varies, however, as to what is the most effective psychotherapeutic technique with asthmatic patients.

During the past decade group-therapeutic techniques have been employed in many areas of psychiatry, including the "psychosomatic" field. BARUCH and MILLER (1947) in the U.S.A. and BASTIAANS and GROEN (1955) in Holland, have treated asthmatics in groups. Both sets of workers claim good results, but as they employed divergent methods and criteria their work is not strictly comparable. There is general agreement that people in a group are influenced by the reactions of those around them and that certain emotions readily become intensified in this setting. When such features can be adapted and harnessed to therapeutic goals, group psychotherapy offers a valid approach to a number of emotional problems. The present writers considered it worth while to explore the possibilities of this method in treating selected asthmatic patients. It was felt, too, that group psychotherapy might prove a reasonable means of treatment a number of patients that would constitute a very heavy commitment if accepted for individual psychotherapy.

METHOD

This paper is mainly concerned with an account of the psychodynamic process and with a consideration of the results of group psychotherapy carried out with 16 female asthmatic patients. Their ages ranged from 19 to 42 years, and the duration of their asthma varied from 18 months to 35 years: 10 were married and 6 unmarried. In each case the diagnosis of asthma was made by the physician (J. A. C.) who, incidentally, had neither special psychiatric training nor personal experience of group psychotherapy.

The physician sees all patients who are referred to an asthma clinic, and after the initial examination makes an assessment of the relative preponderance in each case of the aetiological factors of allergy (*A*), respiratory infection (*I*), and psychological disturbance (*P*). Evaluation of the *A* factor depends chiefly upon skin testing, with special reference to inhaled allergens, and to the degree of consistency between these tests and the clinical history; and of the *I* factor upon the presence and degree of

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chronic infection of the upper or lower respiratory tract, and upon its apparent relationship with the development of the asthmatic picture. Appraisal of the *P* factor depends to a considerable extent upon a subjective summing-up of the patient's personality, background and history. The presence of tension or anxiety is not necessarily of significance; a clear association between emotional stress and the onset of asthma attacks is required for positive assessment of the *P* factor. Patients are encouraged to give the history in their own way and later, if need be, questions are asked about their psychological adjustment, marital situation, early life, dreams, and so on. Significance is attached to life-situations connected with the onset of asthma, especially when a recurring pattern is evident.

Patients of all ages are seen at the clinic. The *P* factor is, among the adult patients, most prevalent in women in the 16–45 age-group. The physician was of the opinion that this factor in such patients called for psychotherapeutic help.

To assess the results of group therapy, control groups were set up as follows:

Group I. (The experimental group.) Predominant *P* factor, and considered to be in need of psychotherapy; all females. Treated by group therapy and standard physical measures (16 cases).

Group II. Predominant *P* factor, yet not considered to be in need of psychotherapy; all females; matched for age and sex with each patient in Group *I*. Treated by standard physical measures only (16 cases).

Group III. Predominant *P* factor and in need of psychotherapy, but for various reasons unable or unwilling to attend; male and female group. Treated by standard physical measures only (28 cases).

Group IV. Predominant *P* factor and in need of psychotherapy; male and female group. Treated by group therapy (two psychiatrists) and standard physical measures (6 cases).

Group V. Predominant *A* factor with low *I* and low *P* factors; male and female group. Treated by standard physical measures only (19 cases).

Group VI. Predominant *I* factor with low *A* and low *P* factors; male and female group. Treated by standard physical measures only (11 cases).

Group VII. All patients under treatment at the asthma clinic during 1954, with all combinations of *A*, *I* and *P* factors and treated by all methods (226 cases).

All the patients in these seven groups were between the ages of 16 and 45.

The types of physical treatment employed were mainly specific and nonspecific hyposensitization, vaccine treatment, plastic correction of nasal obstructions and deformities, and bronchodilator drugs. Cortisone and corticotrophin were used in only a few cases for short spells.

The psychiatrist treated the experimental group on an outpatient basis. Psychotherapeutic sessions were held once weekly in the University Department of Psychological Medicine, Southern General Hospital, Glasgow, and each meeting lasted one hour. The treatment commenced in April, 1954, and terminated in April, 1956, there being 100 sessions altogether. The continuity of the meetings was maintained as far as possible, but over the two-year period there were three short breaks in the treatment owing to the psychiatrist's holidays. A casual seating arrangement was adopted, except that it was thought advisable for the therapist to occupy a constant position in the group.

No observer was employed. This may be regarded as a limitation of technique, but it was felt that the presence of an observer might evoke excessive anxiety in the group, as well as the complication of "split transference" reactions. Detailed and, as far as possible, chronological notes of the proceedings were dictated immediately after the sessions.

The aims of this approach were to attempt to answer the following questions:

(1) What are the psychodynamics, transference relationships, verbal content, and behaviour of such a group?

(2) Is the group a therapeutic agent?

As far as the patients were concerned, they were given to understand simply that they were participating in a treatment programme which aimed specifically to highlight, study, understand and cope in a realistic manner with any emotional problems associated with their asthma. Implicit in the project was the concept of "no research without therapy"; that is to say, it was held that clinical research of this type must necessarily transcend mere fact-finding and must employ the doctor-patient relationship for therapeutic purposes.

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THERAPEUTIC TECHNIQUE

The approach to the patients, while not adhering rigidly to the formal procedure of psychoanalysis, was nevertheless based upon a flexible exploitation of psychoanalytic concepts in the group situation. It was felt that the orthodox passivity of the analyst could not be strictly applicable in group work, which necessarily involves face-to-face contacts and accordingly a certain amount of informality. Such basic concepts, however, as those of psychic conflict, unconscious motivation, repression and the dynamic significance of fantasies and dreams were employed in the understanding and interpretation of the group's productions.

No leading questions were asked by the psychiatrist, nor were themes dictated to the patients. The treatment, therefore, while not rigidly psychoanalytic in nature was, on the other hand, far removed from the "repressive-inspirational" approach in which the psychiatrist adopts the didactic role of a teacher or lecturer. Apart from giving some initial encouragement to the patients to discuss all relevant aspects of their asthma attacks and of their life-situations, the psychiatrist confined himself to making comments intended to establish a secure and permissive atmosphere in which free and friendly discussion could take place. From time to time, too, he made remarks designed to maintain the cohesion of the group and to prevent any serious threat of disintegration. Attempts were made also to encourage spontaneity on the part of the patients.

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As mentioned previously, direction or "stage-managing" of the sessions was avoided by the therapist; but at times when the discussion seemed grossly irrelevant over a sustained period, he would guide or re-channel the conversation by emphasizing the following basic principles: (1) the value of verbalizing inner feelings, (2) the possible significance of life-situations in relation to asthma attacks, (3) the relevance of interpersonal relationships in general, and (4) the importance of childhood experience as a determinant of adult reactions. The main emphasis was upon the "here and now"; i.e. "digging into the present" took precedence over "digging into the past."

The technique followed that of FOULKES (1948). This entailed regarding the patients rather than the psychiatrist as being the pivot of the group. As FOULKES writes, "If the conductor follows the group he will find that it puts him in exactly the position in which it needs him most. . . . He should eventually become superfluous, but this is at the same time the ideal end of all treatment." Interpretations and clarifying comments made by the psychiatrist were often intended to indicate the "latent content" underlying the "manifest content" of the statements made. Other interpretations concerned patient-patient interactions; others again dealt with obvious transference material, as revealed by the content.

For the most part the use of technical terms by the psychiatrist was avoided, though it was felt that such basic ideas as "anxiety" and "conflict" should be communicated as the need arose. The general principle was that the psychiatrist should learn the language of the patient rather than that the patient should learn the psychiatrist's. When making interpretations, the psychiatrist sometimes found that communication was facilitated by adopting the language of the allergist—he might say, for instance, to a patient, "Some of your asthma attacks seem to come on because you are hypersensitive to situations in which an older woman is criticizing you."

To summarize. The concept of group therapy employed was of a process occurring in an interpersonal field which included the psychiatrist. The events occurring in the group were both observed and shared by the psychiatrist; i.e. the psychiatrist's role was that of a participant-observer. No assumptions were made as to the question of specific conflict or personality type in asthma.

PROCEDURE

At first the patients were not seen individually by the psychiatrist before coming to the group. The idea of attending for group therapy was proposed to them by the chest physician. Though he had observed beneficial effects in patients whom he had previously referred for individual psychotherapy, the physician was somewhat sceptical about the value of group treatment, especially in patients with pressing emotional problems. His presentation of the need for group therapy was thus made in a neutral manner and with some personal reservations. The physician maintained contact with all patients in Group I except one; as a rule they were seen at intervals of not more than three months, but attended him more frequently if necessary. When the patient seemed to have become integrated into the group, emphasis was placed upon the importance of continuing psychotherapy, but physical measures, such as hyposensitization and the exhibition of bronchodilator and antihistamine drugs, were carried out as necessary, as with the control groups.

Over a period the physician noted that the patients who were attending for group therapy became gradually more dissociated from the general clinic attitudes and less influenced by clinic gossip. The patients and the clinic nursing staff began to refer, if a little erroneously, to this group as "Dr. S.'s class."

Patients who attended the group for only a few sessions generally continued to attend the asthma clinic after leaving the group. In at least one case, however, the patient's rejection of the group was so violent that it extended to the asthma clinic and indeed to any person connected with either the group or the clinic.

Eight patients attended the first session of the group; but within a few sessions it was obvious that the problem of "wastage" was becoming a significant one. Some patients attended only a few meetings, and accordingly new patients were introduced from time to time in order to establish a stable group. Care was taken to introduce new patients one at a time, and not too frequently, in order to allow the group to assimilate them more readily. Nevertheless, the arrival of new patients often led to much tension, repeated silences and indirect expressions of hostility in the group. The group was regarded as an "open" one in so far as the psychiatrist brought in new patients periodically, and also in the sense that any patients who had absented themselves for a time (in one instance, as long as eighteen months) could still feel free to return.

After three months the psychiatrist decided to interview any new patients individually before they commenced treatment in the hope that this would produce a more stable group. Thus the idea of attending for group therapy was now presented by the psychiatrist rather than the physician. This facilitated a more detailed explanation of the purpose of the group, and of what was required of the patients. Such a procedure also allowed the patients to ask questions and voice any doubts about the treatment. In fact, this step contributed to the stabilization of the group.

It was noted that the patients soon began to adopt of their own accord a more or less constant seating arrangement within the group. For example, Patient *A*, whose own ambition to become a doctor had been thwarted and who became a leader in the group, always sat on the immediate right of the psychiatrist. Another patient (*H*), who was so terrified of the group that she had aphonia for three weeks after her first attendance, thereafter sat as near the door as possible. The more inarticulate patients sat at a "safe" distance from the psychiatrist, and often one or two chairs remained vacant, especially on the therapist's left.

The number of patients varied from one session to another, but there was throughout a constant nucleus of regular attenders. The usual attendance was four or five patients (mean 4·6); the maximum was eight (on four occasions) and the minimum, one (on two occasions). Even with one patient present the sessions continued as usual.

A total of 25 patients attended the group during the two-year period. Nine of them attended less than five times and, it being assumed that such patients had not really entered into therapy, they were excluded from consideration when the results of treatment were finally assessed. Varying patterns of attendance were observed among the remaining 16 patients. Some attended regularly over long periods; others came irregularly, and a further number showed spells of enthusiasm alternating with periodic absences. There was on each occasion a falling-off in attendance during the few weeks after the therapist returned from his holiday. One patient broke off treatment altogether when the psychiatrist went on holiday.

Table 1 shows basic data concerning the 16 patients, including age, marital status, duration of asthma (in years), and attendance at the group (maximum 100):

TABLE 1.—BASIC DATA

Patient	Age	Married/Single	Duration	Attendance
A	30	M	18 years	80
B	29	M	27 years	71
C	37	M	35 years	53
D	40	M	4 years	44
E	31	M	4 years	42
F	23	S	3 years	31
G	32	M	20 years	21
H	42	M	12 years	19
I	29	S	23 years	14
J	21	S	5 years	14
K	31	S	29 years	13
L	27	M	4 years	10
M	28	S	8 years	10
N	19	S	17 years	9
O	21	M	1½ years	6
P	24	M	17 years	6

COURSE AND DEVELOPMENT OF THE GROUP

A review of the life-span of the group indicated that it underwent a process of development and maturation over a long period. The therapeutic aim was to help the patients gain insight into any emotional difficulties associated with their asthma and by "working through" them to obtain symptomatic relief. No patient reached this goal, but various degrees of clinical improvement and in some cases partial insight were achieved. The varying results were no doubt related to differences in intellectual level, social class, plasticity of personality, articulateness, and attitude to treatment among the patients. They progressed at different rates in the group and the total picture was accordingly a complex one.

During the treatment various "resistance" manifestations were observed. At times, for instance, the group as a whole was evasive and defensive; at others, there were frank expressions of hostility towards doctors, nurses, government ministries, and authoritative figures in general. Sometimes the group could not readily be deflected from physically oriented topics such as the allergic theory of asthma or the relative merits of various drugs. Resistance often appeared to "come in waves," i.e. a psychologically productive session would often be followed by marked resistance which in turn gave place to a more positive attitude again. In spite of these complexities, however, the history of the group showed definite developmental trends, especially in the direction of increasing psychological understanding.

An analysis of all the leading themes which arose during the sessions was carried out. On this basis the proceedings of the group were arbitrarily classified into ten phases in chronological fashion as follows:—

Phase I (Sessions 1–10)

At first the group plainly feared and resented a psychotherapeutic approach to their illness. The patients as a whole displayed marked tension and anxiety at the outset. One of them (Patient *N*) at the first session spoke of "feeling butterflies" in her stomach and expressed a fear that the psychiatrist would ask penetrating questions of a personal nature; accordingly she told the group that she had prepared in advance a list of false answers to the anticipated questions. Another lady (Patient *A*) characterized psychiatrists as being "incompetent" and "naive." The relevance of emotions to asthma was hotly contested, and physical "counter-theories," e.g. climatic, allergic, etc., were advanced by the patients. Even in the first session, however, the group began to admit the possible association between asthma and aggressive feelings in particular; Patient *A* said her asthma had been considerably worse when living with her hypercritical mother-in-law.

In general, the ventilation of hostile feelings was the main dynamic feature in the early sessions. Much resentment was expressed towards dominating mothers, disobedient children and doctors; the chest physician, however, was exempted from these criticisms and his views were often pitted against those of the psychiatrist.

After three sessions, Patient *I*, who had not previously worked for nine years, was able to take up work as a shop assistant at a milliner's. This development resulted largely from the group's encouragement to rebel against her tyrannical mother, and it represented the first obvious therapeutic experience in the group. Patient *I* was subsequently unable to attend the group regularly, but her case was often quoted by the other patients who frequently visited her and bought hats at her shop.

Inability to control their children became a dominant theme in the group. There was also some tentative discussion of disturbed relationships between the patients and their mothers. The patients felt that in childhood they had been the unwilling and helpless puppets of their mothers, but equally they wished to dominate their own children as their mothers had dominated them.

Phase II (Sessions 11–20)

Fear of the group and resistance remained prominent. Patient *N* in particular expressed many magical ideas; e.g. she had been acutely disappointed on realizing that her asthma did not disappear miraculously on her fourteenth birthday, but still entertained hopes that it would yet clear up on her twenty-first birthday. More positive features, however, now began to appear. Some of the more articulate members, especially Patients *A* and *C*, began to advocate to the more silent patients the value of verbalizing one's feelings. The group began to regard itself as a therapeutic force. Patients *A* and *C* said that group therapy was having a beneficial effect, not only upon their asthma, but also upon their anxiety and their interpersonal relationships. The group gradually became less inhibited and the patients talked increasingly about the ambivalent relationship they had had with their mothers.

Leader and "audience" roles began to emerge in the group. Patients *A*, *B* and *C* clearly belonged to the first category, while Patients *D*, *E*, *F* and *G* belonged to the latter.

There was much discussion about the pattern of their asthma; e.g. several patients had been strikingly free from asthma during pregnancy, or when on holiday or in hospital. In the case of

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Patient *N* weeping or asthma were noted to have occurred as alternative responses to frustrating situations. Several complained of claustrophobic feelings during asthmatic attacks, experiencing fears of being enclosed, of suffocating, and of the air supply around them being used up by others.

Phase III (Sessions 21–30)

As previously, resistance and fear of the group continued, and there were occasional declarations that feelings had nothing to do with asthma. There were further criticisms of doctors, again with strong transference implications. In addition, government authorities, social agencies, etc., were ridiculed and criticized. The discussions, too, still reverted at times to speculations about the role of allergy.

Session 24 was an important one psychologically. Patient *A* had noted that, while attending the asthma clinic one day, all the asthmatic children who came to see the physician appeared anxious, inhibited and "old-fashioned." At the same time she observed that their mothers seemed "very prim and proper," cold and undemonstrative. The group used this material by identifying themselves with the asthmatic children and by voicing further hostile feelings about the unsatisfactory relationship with their own mothers. This session was later recalled on numerous occasions and the group regarded this sketch of the mother-child relationship in asthma as having been "proved beyond doubt."

The rigidity of the patients' personalities began to emerge, e.g. their need to maintain high standards of housekeeping and to make their offspring "model children." In many of these respects they clearly resembled their own mothers. The group became a forum for the discussion of family difficulties in general, and aggressive attitudes towards relatives, especially mothers-in-law and sisters-in-law, were often revealed. The patients frequently said they could talk more freely in the group than with their husbands.

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Phase IV (Sessions 31–40)

By this stage the patients felt more secure in the group. Several reported an improvement in their asthma and some said the group experience had allowed them to become less inhibited in their everyday relationships. There was some evidence, too, of mutual help among the patients outside of the sessions, e.g. baby-sitting for each other.

They began to discuss spontaneously life-situations associated with the onset of asthma attacks. Patient *B* recounted how she had had a severe bout of asthma on learning of the death of an elderly neighbour. Patient *A* said she had developed asthma on hearing two other ladies discuss some technical problems of baking; she felt very humble and inferior because she herself did not know how to bake.

The patients continued to discuss their anxiety in their role as mothers. They wanted their children to be "perfect" and accordingly became angry and often had asthma when their children failed to comply with their demands. In general, they had much conflict over expressing aggressiveness; most of them expressed a desire for peace at any price, yet could not control their resentment on meeting even minor frustrations.

Resistance themes persisted in this phase, but were less prominent than formerly. At one point when the therapist made a premature interpretation about longings for dependency, a stream of invective about psychiatry ensued. Doctors in general were again reproved; it was said that they were unscientific, non-committal and mainly interested in money.

Phase V (Sessions 41–50)

This phase was marked by greater stability in the group. Certain patients were evidently becoming enthusiasts about group therapy, while others absented themselves a good deal. The more regular attenders formed an "in-group" and discussed possible reasons why others had discontinued treatment; they thought that the less enthusiastic members were deriving secondary gains from their asthma.

The transference situation involving a number of female patients and a male therapist was probably connected with the development of positive feelings in the group. Without exception all the patients spoke of their intense attachment to their fathers. They said that during childhood, when denied anything by their mothers, they "could always get round" their fathers. None of them could ever confide in their mothers.

There was further discussion about the association between emotions and asthma. Patient *H*

reported an asthma attack on moving to a new house; she could not accept the responsibility of looking after a larger house. Apart from the topic of asthma, there was much talk of problems with neighbours and relatives. The patients in general preferred appeasement or masochism to the "danger" of voicing their hostility. Nevertheless, at this stage some criticisms were made of the administration of the asthma clinic; the patients evidently felt it safe to do so at a distance.

Phase VI (Sessions 51–60)

The group was now becoming rather dependent on Patient *A* who was articulate to the point of garrulousness. The others were tense and anxious if she was absent.

More childhood material emerged. All the patients stressed that they were never allowed, or were always afraid, to show any aggressiveness whatever. Some described traumatic respiratory incidents in childhood, e.g. falling into a pond and being unable to swim.

They began to express negative transference feelings, albeit tentatively. Psychotherapy was compared unfavourably with hypnosis and faith-healing. Hostile attitudes towards various authorities and towards men in general—and husbands in particular—were verbalized. Criticisms were made of those patients who absented themselves from the group. Some patients at this stage experienced some worsening of their asthma when the psychiatrist was on holiday for a few weeks.

Phase VII (Sessions 61–70)

The patients reported further improvements in their asthma and some spoke about how important it was "not to lie down to the asthma." There were comments indicating more flexible attitudes and less intolerance with their children. At the same time some patients remained very dependent upon their inhalers which they carried with them everywhere. Their clinical improvement was paralleled by continued expressions of resentment, especially towards the nurse in charge of the asthma clinic; this was closely associated with further material concerning ambivalent feelings towards their mothers. Fear of authority was still prominent and doctors were again castigated.

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Phase VIII (Sessions 71–80)

At this stage it was obvious that the patients were progressing at very different rates and that their capacity for insight varied greatly. Those who had achieved a degree of self-understanding were impatient with others who continued to manifest resistance and denial. There was also some competition for leadership in the group hereabouts.

There were continued petty criticisms of the administration of the asthma clinic, but nevertheless the physician himself received unstinted praise. The discussions centred a good deal around feelings of failure in the maternal role, and unexpressed resentment as an accompaniment of asthmatic attacks was generally acknowledged.

Phase IX (Sessions 81–90)

All the previous themes were elaborated further, e.g. the tendency to deal with hostility-laden situations by means of martyred submission, fears of responsibility and the occurrence of asthma attacks on separation from the mother-figure. Strongly positive feelings towards the group itself were expressed and there was some discussion of possible ways in which the group produced benefit. The value of "confessing" to an understanding audience was brought out. Furthermore, the patients recognized a bond of identification among themselves because they all suffered from the same illness. When the therapist introduced a new patient at this stage the group proudly displayed their psychological wisdom by enthusiastic descriptions of associations between their own life-situations and their asthma.

Phase X (Sessions 91–100)

The patients talked increasingly about the intra-group dynamics, e.g. they discussed reasons why the most fruitful material often emerged towards the end of a session. They also speculated about the egocentricity of their own characters. Disapproval was voiced regarding one or two patients who were still doubtful about the role of emotions in asthma.

Outlets for aggression were again found through criticisms of various authoritative figures; there were some mild expressions, too, of negative feelings towards the psychiatrist. Earlier resistance themes, e.g. allergy, heredity, etc., again cropped up briefly.

IS THE GROUP A THERAPEUTIC AGENT?

It is notoriously difficult to assess the results of any treatment in bronchial asthma. The natural course of the illness is characteristically irregular and episodic and, furthermore, it is not easy to obtain objective criteria for evaluation of results. Uncomplicated asthma involves much subjective discomfort, but little in the way of fixed objective signs. In this study it was decided that the physician and the psychiatrist should independently make a private assessment of the Group I patients at the conclusion of treatment. This was carried out by means of individual interviews. It may be noted here that the physician was not involved in the group psychotherapy and that his personal bias was, if anything, somewhat against rather than in favour of this method. In addition to the patients in Group I the physician evaluated those in each of the control groups.

In making his own assessment of the patients' asthma the physician employed the following clinical criteria to compare their condition with that obtaining prior to treatment:

(1) Frequency and pattern of asthmatic bouts.
(2) Severity and duration of asthmatic bouts.
(3) Amount of bronchodilator drugs used.
(4) Other symptomatic changes, e.g., bronchitic symptomatology.

Table 2 shows the results of this assessment.

TABLE 2.—PHYSICIAN'S ASSESSMENT OF ASTHMATIC SYMPTOMATOLOGY

	Group I	Group II	Group III	Group IV	Group V	Group VI	Group VII
Complete alleviation or marked improvement	11	10	13	5	10	6	111
Slight improvement or unchanged	4	3	12	1	9	4	110
Worse	0	0	2	0	0	1	3
Not traced	1	3	1	0	0	0	2
Total	16	16	28	6	19	11	226

These results, which refer strictly to the respiratory symptomatology of asthma, do not indicate that the changes which occurred in Group I are significantly different from those in any of the other groups. There is in fact nothing in this assessment to suggest that group psychotherapy exerted a specifically beneficial effect upon the asthma *per se*.

The psychiatrist likewise made an assessment of the Group I patients in respect of

their *asthma*. His results, which were not entirely concordant with the physician's, are shown in Table 3.

It will be seen that the psychiatrist's estimate was relatively conservative in comparison with that of the physician. This discrepancy underlines the variability of subjective clinical criteria of assessment between different observers. It is suggested that the physician's assessment of the patients' asthma may have been unconsciously influenced in the direction of optimism by certain psychological changes in the patients. While making his assessment the physician spontaneously commented that, apart from the asthma, the patients who improved with group therapy (Groups I and IV) displayed marked *personality changes* after treatment. These patients, in

TABLE 3.—PSYCHIATRIST'S ASSESSMENT OF ASTHMATIC SYMPTOMATOLOGY

	Group I
Complete alleviation or marked improvement	3
Slight improvement or unchanged	9
Worse	1
Not traced	3
Total	16

his opinion, showed greater acceptance and tolerance of individuals, situations and institutions which previously had aroused aggressive or other strongly coloured comment. They were generally less afraid and, in particular, this change was very striking in regard to their asthma; during the latter months of the group's existence any exacerbations of their asthma which occurred were notable for the relative lack of concomitant anxiety. They expressed positive feelings for the group and for its aims and values: at the same time, they did not regard the psychiatrist as having enforced any didactic teaching upon them. Broadly speaking, they could readily be differentiated from a population of "difficult" chronic asthmatics by their most robust and constructive attitude towards their life-situations and their asthma.

In his assessment of the Group I patients, the psychiatrist also employed a standardized interview with the object of noting any personality changes. The results of this psychological assessment are shown in Table 4.

It will be noted that the psychiatrist's pattern of results for *personality change* (Table 4) closely follows that of the physician regarding *asthmatic symptomatology* (Table 2). This reinforces the suggestion that the physician's assessment of the patient's asthma may have been influenced by the personality changes which they displayed.

It is concluded that the addition of group psychotherapy to a standard medical regime has not been shown to exert a specifically favourable effect upon the asthma. Group therapy is capable, however, of promoting increased frustration-tolerance as

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well as diminished social inhibition, tension and anxiety in asthmatics who show predominant emotional factors in the etiology of their illness. It is well-known that chronic asthmatics have their own level of dyspnoea which determines their actual complaints to the doctor. Possibly group therapy may act, *inter alia*, by raising this threshold of complaint.

TABLE 4.—PSYCHIATRIST'S ASSESSMENT OF PERSONALITY CHANGES

	Group I
Diminished anxiety: increased confidence: improved social relationships	9
Unchanged	3
Increased anxiety	1
Not traced	3
Total	16

DISCUSSION

As indicated, the clinical evaluation of the results of group psychotherapy has failed here to show that this treatment favourably influences the respiratory manifestations of asthma. It has also been shown that different observers may vary in their appraisal of these symptoms. On the other hand, both physician and psychiatrist were agreed upon the occurrence and nature of certain well-defined personality changes in the patients. These changes included: attitudes of increased tolerance and acceptance, reduced anxiety and tension, lessened rigidity and improved socialization. This type of amelioration closely corresponded with the adjustment changes generally achieved by group therapy with psychoneurotic patients.

It is instructive to compare these results with those obtained by other workers in this field. BARUCH and MILLER (1947) gave an account of group therapy with asthmatic patients of both sexes, but their method differed from that of the present writers in the following respects: (1) they treated private rather than hospital patients, (2) their asthmatic patients were admixed with dermatological and neurotic patients, (3) their sessions lasted 1½ hr rather than 1 hr, (4) their patients received concomitant individual psychotherapy, and (5) no control groups were set up. Nevertheless their orientation was similar in that they employed a dynamic approach within a permissive setting. Of their ten patients, 7 were completely alleviated or markedly improved, and 3 were slightly improved or unchanged as far as their asthma was concerned. Thus their results in numerical terms resembled those obtained in Group I in the present paper. Like the present authors they noted that their patients, after therapy, were less tense, more outgoing and self-confident, and functioned better at their jobs. They concluded that group therapy in parallel with medical treatment helped most of the patients with their allergic as well as with their personality problems. In view of the lack of controls, however, this statement seems too far-reaching. It is

suggested here that group therapy, though it may promote favourable personality changes, has not been shown to have a direct effect on the allergic manifestations.

MARKILLIE (1955) discussed the value of group therapy in psychosomatic disorders though he did not refer specifically to asthma. He advocated robust interpretation of the transference and criticized BARUCH and MILLER (1947) for their failure to do this. Ideally such adherence to strict psychoanalytic technique may yield the best results in individual psychotherapy, but the present writers seriously doubt whether many timorous asthmatic patients could tolerate what, to them, might seem a highly unfriendly atmosphere, painfully reminiscent of the relationship they had with their parents.

The present work has some affinity with that of BASTIAANS and GROEN (1955) who likewise observed that their asthmatic group initially displayed much scepticism about a psychotherapeutic approach as well as hostility to the group method with denial of the relevance of emotional factors and aggressiveness towards authority in general. As in the present study, more positive attitudes gradually developed, though the patients at the end of treatment could not be regarded as "cured." Employing control groups, these workers considered that patients who received a combination of corticotrophin and group therapy did best of all. They concluded that the results of adding group therapy to the routine medical treatment of asthma justified the considerable efforts they had expended. However, it may be objected that the results given in their paper do not provide a statistical basis for the claims made in favour of group therapy. The numbers of patients in their groups are too small for valid comparison and furthermore no detailed information is provided as to the age and sex of their patients or the chronicity of their asthma.

PELSER (1956) has pointed out the need for caution and mature judgment in making interpretations to asthmatic patients; such intervention, if prematurely or unsubtly made, may actually induce asthma, especially in the case of less articulate patients. He regards the following as unfavourable criteria for the application of group therapy in asthmatics: (1) advanced age, (2) poor marital adjustment, (3) chronic unemployment, (4) lack of sincerity in treatment, and (5) inability to introspect. When this framework is employed for the analysis of the 9 patients who did not persevere with group therapy in the present study, the following results emerge:

Relatively advanced age	2 cases.
Poor marital adjustment	1 case.
Chronic unemployment	1 case.
Lack of sincerity	2 cases.
Inability to introspect	3 cases.

Regarding the precise *modus operandi* of group therapy, there is much divergence of opinion among contemporary writers. SLAVSON (1950), however, provides a useful conceptual basis for discussion of this question. He considers that the chief elements in the treatment are (a) the development of transference, (b) the promotion of verbal catharsis, and (c) the achievement of insight through social interaction and interpretation in the group.

In the Group I patients described above, anxiety and defensiveness were noted at the outset: the psychiatrist, however, did what he could in the early stages to

establish a stable group in which the patients could trust each other as well as the psychiatrist himself. This was the stage of developing the *transference*. The group became a situation wherein the patients felt accepted and had a sense of belonging. There was a good deal of mutual support and encouragement among the patients. Patient *C*, for instance, masochistically submitted herself to the harsh demands of her husband's family, but was supported, and even incited to rebellion, by the other patients.

Five of the total 16 patients—Patients *E*, *G*, *J*, *L* and *O*—were considered to have derived psychological benefit *solely* upon the basis of transference. Patient *E*, for example, showed striking clinical improvement; she enjoyed the sessions, yet was almost completely silent and inhibited throughout; no significant verbal catharsis occurred and she gained no insight.

Another sub-group of patients, seven in number—Patients *D*, *F*, *H*, *K*, *M*, *N* and *P*—developed sufficient feelings of security and trust in the group to be able to verbalize emotional problems and to test their feelings against those of the other members. They spoke comparatively freely about conflicts which were not only directly associated with their asthmatic attacks but which also created difficulty in other areas of their lives. Patient *H*, for instance, was initially terrified of the group but eventually acquired a strong sense of membership and discharged intense hostile feelings towards her five sisters; she was unable, however, to perceive any connection between her emotional problems and her asthma. This type of amelioration was considered to have resulted from *transference plus catharsis*.

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A third section of Group I consisted of four patients (*A*, *B*, *C* and *I*) who not only developed a positive transference relationship associated with a capacity to communicate their feelings in the group, but also acquired a measure of insight into their behaviour and mechanisms. They were able to introspect about their difficulties, did a certain amount of psychotherapeutic "homework" and generally accepted interpretations made by the psychiatrist and by other patients. Patient *B*, for instance, told the group how several bouts of asthma had been triggered by acute resentment of her mother-in-law's domination, and of how her husband disallowed the expression of such feelings at home; later she recognized this hostility as a displacement of unexpressed aggressive feelings towards her own mother. This type of improvement was thought to have resulted from *transference plus catharsis plus insight*.

The group of five patients who improved solely on the basis of transference had an average of 18·2 attendances per patient; the seven patients who benefited as a result of transference plus catharsis averaged 18·7 attendances each, while the four whose amelioration was also accompanied by insight had an average of 54 attendances per patient. These figures indicate that the acquisition of insight may be, *inter alia*, a function of longer attendance and greater perseverance or, more probably, that both the capacity for insight and the ability to weather the vicissitudes of the group over a long period are alike functions of personality. Those patients who gained a measure of insight appeared to pass through a phase in maturation, emerging finally as less anxious and less inhibited people, Group therapy may therefore act as a means of promoting "ego expansion" in a previously rigid or immature personality, as HALLOWITZ (1954) has suggested.

The dynamics and assessment of the Group IV patients, who were also treated by means of group therapy, are discussed elsewhere (CLAPHAM and SCLARE: in press).

A widely accepted methodology for the practice of group therapy has not yet been established. BURCHARD *et al.* (1948) have underlined the need for standardized methods of reporting upon group therapy in order to establish a series of comparable data among different workers. In our present state of knowledge, however, it is clear that this type of treatment, far from being a short-cut for the novice, calls for skill, perseverance and, at times, restraint. Group therapy, though it may not influence the allergic problems *per se*, can facilitate significant emotional changes, including an altered attitude towards the asthma itself. The group situation seems to provide a matrix of identifications and a source of security in which therapeutic experiences can take place. Follow-up studies will, of course, be required in order to determine whether beneficial results are maintained or not, and to discover whether this treatment increases or decreases the likelihood of other psychosomatic manifestations arising in the future lives of the patients.

The present study emphasizes the comparative unreliability and variability of subjective criteria in assessing the progress of asthmatic patients. Accurate scientific work will demand objective criteria of evaluation. Such objective criteria must take account of both respiratory and psychological events. Furthermore, the present etiological classification of asthma has insufficient scientific basis as yet.

SUMMARY

(1) 16 female asthmatic patients, considered to have preponderant emotional factors in their illness, were treated by means of group psychotherapy on an out-patient basis. The treatment was given by a psychiatrist, while physical treatments were concurrently given by a physician.

(2) Six control groups of varying composition were set up, all having routine medical treatment. One of the control groups also had group psychotherapy and is described in detail elsewhere.

(3) The experimental group was treated by a modified analytic technique which closely followed that of FOULKES (1948).

(4) The development and content of the group sessions are described in detail.

(5) The results of treatment were assessed on a clinical basis. The experimental group did not fare significantly better than the control groups in respect of asthmatic symptomatology: marked diminution of anxiety, tension and inhibition were, however, noted in this group.

(6) The group dynamics are discussed and the problems of therapy are reviewed in the light of recent work by others in this field.

(7) Group psychotherapy may prove to be a valuable addition to the treatment regime in those asthmatic patients who manifest a significant emotional factor in their illness.

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AN AETIOLOGICAL STUDY OF CHRONIC URTICARIA AND ANGIONEUROTIC OEDEMA

LINFORD REES, M.D.*

INTRODUCTION

DESPITE the fact that urticaria and angioneurotic oedema are common disorders with an extensive medical literature, considerable controversy continues regarding their aetiology.

In a recent survey entitled "The vexing urticaria problem," SHELDON *et al.* (1954) refer to the divergence of opinion on the role of various possible causative factors in the disorder.

Contrasting opinions exist on fundamental issues such as whether urticaria and angioneurotic oedema are manifestations of the same disorder or are different nosological entities as suggested by BRUUN and DRAGSTEDT (1950), who claim that chronic angioneurotic (QUINKE's) oedema is more frequently allergic in origin than chronic urticaria. While there may be more agreement that acute urticaria and angioneurotic oedema are frequently allergic in origin, there is little uniformity of opinion regarding the relative importance of allergy and other causative agents in chronic forms of these disorders.

OSLER (1914) first suggested an allergic aetiology for angioneurotic oedema, a view supported by COOK and VANDER VEER (1916). Some authors, e.g. ROWE (1937), claim that the two conditions are probably always due to allergy. BRUUN and DRAGSTEDT (1950) found an allergic basis in 56% of their series of angioneurotic oedema patients, while GRAHAM and WOLF (1950) did not find any allergic factors in their group. Similarly, there is marked variation in views regarding the role of psychogenic influences. QUINKE (1882), in his classical account of angioneurotic oedema, regarded it mainly as a neurotic disorder. STOKES *et al.* (1935) found psychiatric causes in 68%, GRAHAM and WOLF (1950) in all their cases, whereas FINK and LESLIE (1934) found psychogenic factors in only 18%. In psychosomatic studies on urticaria and angioneurotic oedema there is also considerable divergence of opinion on the nature of psychogenic influences considered to be causally important. These differences relate to specificity of personality attributes, the types of life situation and emotional change alleged to be associated with urticaria and angioneurotic oedema, and will be discussed later. Thus there is little agreement in the literature on the relative importance of allergic and psychogenic influences or on the nature and precise role of the latter.

These differences may be due to differences in methodology, in criteria utilized for aetiological assessment, or to factors of selection giving rise to groups of different composition.

PRESENT STUDY

The object of the present study was to study the relative incidence and importance of various causative factors in a random sample of chronic urticaria and chronic angioneurotic oedema patients.

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The patients were unselected and consisted of successive referrals of patients with urticaria or angioneurotic oedema of over three months' duration to the out-patient departments of St. David's Hospital, Cardiff, and East Glamorgan Hospital.

Urticaria consists of localized superficial oedematous swellings of the skin and angioneurotic oedema of localized oedematous swellings affecting the subcutaneous and deeper tissues. All the cases were of over three months' duration. Each patient was investigated from the physical and psychiatric aspects. Detailed allergic and physical investigations were carried out by my colleague, Dr. D. A. WILLIAMS, to whom I am indebted for his kind co-operation and for providing facilities for the study.

Psychiatric investigation was carried out by the author without knowing the result of allergic and other physical investigations.

A control group of similar age and sex distribution was studied and assessed by the author, using the same standards and criteria as for the urticaria group. The control group consisted of patients who had herniotomy and appendicectomy operations. These were randomly selected and matched for age and sex distribution with the urticaria group.

AETIOLOGICAL CONCEPTS

Aetiology is a complex subject, as there are theoretically a very large number of possible causes to any disorder. These may be immediate or remote, direct or indirect, precipitating or predisposing, and may relate to the individual or the environment or to their interaction.

In clinical practice the problem resolves itself into determining which factors are relevant and causal to the disorder. It is desirable to ascertain and assess the aetiological factors determining the onset, those operating during the course of the illness, and if possible those determining its outcome.

The following factors have from time to time been postulated as being aetiologically important in chronic urticaria and angioneurotic oedema, and will require assessment in our group.

Factors mainly appertaining to the individual

(1) Age and sex,
(2) Genetic and constitutional,
(3) Personality,
(4) Neurosis,
(5) Changes in the "internal milieu" of the body.

Factors relating to environmental-individual interaction

(1) Allergy,
(2) Infections,
(3) Physical agents such as heat, cold, light and mechanical stimuli,
(4) Chemical agents,
(5) Stress and emotional tension.

CLINICAL DATA

The total group of 100 patients consisted of 76 patients with urticaria only, 16 patients with angioneurotic oedema only and 8 patients with angioneurotic oedema and urticaria.

In this paper the group will be considered as a whole, as no evidence was found to support the contention of BRUUN and DRAGSTEDT (1950) that they are distinct nosological entities differing in aetiology.

Comparison of groups of patients with urticaria only (76), with angioneurotic oedema only (16), and those exhibiting both disorders (8), showed no significant difference in the incidence of allergic, psychological, or other causative factors in aetiology. There were no significant differences in age and sex distribution, in family history of allergy or psychiatric disorder, or in the incidence of neurotic symptoms or in personality type.

Sex distribution

The group consisted of 61 females and 39 males. This differential sex incidence is strikingly similar to that found by other authors in samples from different parts of the world as shown below:

	Types	Female (%)	Male (%)
MENAGH (1928)	Urticaria and angioneurotic oedema	65	35
FINK and LESLIE (1934)	Urticaria and angioneurotic oedema	69	31
URBACH (1946)	Urticaria and angioneurotic oedema	61	39
STOKES *et al.* (1935)	Urticaria and angioneurotic oedema	66	33
ROWE (1937)	Angioneurotic oedema	71	29
BRUUN and DRAGSTEDT (1950)	Angioneurotic oedema	66	34

The differential sex incidence still obtains when the total group is subdivided into groups with urticaria only, angioneurotic oedema only, and those with both disorders.

Age distribution

The age distribution at time of examination was as follows: 6–15 years 3%, 16–25 years 20%, 26–35 years 36%, 36–45 years 18%, 46–55 years 18%, 56 years and over 5%.

The age at onset was 0–5 years 2%, 6–15 years 10%, 16–24 years 24%, 26–35 years 36%, 36–45 years 14%, 46–55 years 10%, 56 years and later 4%.

The duration of illness was 3–6 months 8%, 6–12 months 6%, 1–2 years 14%, 2–5 years 11%, 5–10 years 31%, 10–20 years 20%, 20 years and over 10%.

Family history

QUINKE (1882) appears to be the first to demonstrate an hereditary factor in angioneurotic oedema.

SCHWARTZ (1952) in a careful study found that urticaria and QUINKE's oedema showed a mutual marked correlation and also a positive correlation with the asthma group. He considers that angioneurotic oedema is a severe form of the same disease.

As data can only be obtained with reliance from first-degree relatives, our investigation was confined to parents and siblings. The percentage incidence of asthma and related disorders was as follows: Asthma 15%, hay-fever 5%, urticaria and/or angioneurotic oedema 8%, other allergic disorders 10%.

The incidence of 38% is statistically significantly higher than that found in the control group (10%). (The critical ratio being over 5.)

Our findings support the theory of a genetic factor in the aetiology of chronic urticaria.

Personality

A number of authors have attempted to demonstrate a correlation between certain personality attributes and urticaria.

STOKES, KULCHAR and PILLSBURY (1935) concluded from their study of 100 patients that the psychological factors producing urticaria resided more in the nature of the patient's personality than external stresses. The urticariogenic personality was considered to be the driving, high tension, competitive, highly ambitious with intent on goal whatever the cost. A tendency to worry and neuroticism with adjustment difficulties are expressions of the tension and instability which contribute to the disorder.

GRAHAM and WOLF (1950) in a study of 30 patients found as characteristic a passive attitude towards punishment from parents or other superiors and a failure not only to express hostility but even to feel it.

WITTKOWER (1953) studied 35 patients suffering from urticaria and angioneurotic oedema, and found that half of the patients adopted an ingratiating, pleading, or over-accommodating pleasing attitude. They were insecure within themselves, thrived on praise, and were unduly afraid of disappointment or criticism.

The other half also had an intense need for love, but far from begging for what, in fact or fantasy, had been denied to them, they were demanding and tended to become harsh, vindictive, dissatisfied, testy, and morose if they were not given what they felt they were entitled to.

SAUL and BERNSTEIN (1941) described psychological aspects of one case and KAYWIN (1947) on three cases, but it is not permissible to generalize from such small numbers.

There are therefore great discrepancies in the varieties of personality types in urticaria found by different authors. The discrepancies may be due to differences in methods of investigation or approach or may be due to factors of selection giving rise to groups markedly different in aetiology.

In the present investigation a number of personality traits were rated in a three-point scale in a random sample (comprising the first 68 referrals to the clinics) of 68 urticaria and angioneurotic oedema patients and 100 controls by the author, using the same standards and criteria for both groups. The results are shown in Table 3.

The following are the main statistically significant differences.

The urticaria/angioneurotic oedema group has a higher incidence of moderately and very unstable individuals (critical ratio = 3+); somewhat and very sensitive individuals (C.R. = 3); somewhat and very cyclothymic individuals (C.R. = 3+). The differences in anxiety and obsessional traits are suggestive, but do not reach statistical significance.

In some patients, personality attributes are the main determinants of the state of tension which precipitate or are conducive to the development of urticaria, e.g. in some, marked shyness and timidity greatly interfere with successful social adjustment, others are extremely sensitive and harbour feelings or resentment or suppressed

hostility, some have such an inordinate desire for love, affection, and approval which often has to remain unsatisfied. Some patients are hard-working, conscientious, overactive, and self-driving to a degree which conduces to the development of states of prolonged tension.

The importance of personality in urticaria is not so much a matter of specificity but rather to the extent that it determines reaction to stresses, production of emotional tension, and the degree to which emotions are suppressed or inadequately expressed.

TABLE 1.—PERSONALITY RATINGS

	Urticaria and/or angioneurotic oedema	Controls
	(%)	(%)
General stability		
Stable	56	82
Moderately unstable	28	16
Very unstable	16	2
Meek and timorous		
Not	64	57
Somewhat	19	37
Very	16	6
Sensitive		
Not	21	43
Somewhat	28	23
Very	51	34
Anxious		
Not	33	47
Somewhat	28	24
Very	39	29
Meticulous, obsessional		
Not	39	53
Somewhat	26	22
Very	35	25
Schizoid		
Not	88	95
Somewhat	7	4
Very	5	1
Cyclothymic		
Not	69	92
Somewhat	28	6
Very	3	2
Hysterical	7	2
Hypochondriacal	16	2

INCIDENCE OF NEUROTIC SYMPTOMS

The existence of a relationship between neurosis and angioneurotic oedema has been postulated since QUINKE's classical description of the condition in 1882, and was clearly demonstrated by STOKES, KULCHAR and PILLSBURY (1935).

The coexistence of urticaria and/or angioneurotic oedema and neurotic symptoms could be a chance association, as both are relatively common in the general population, so that a certain overlap would be expected.

The question therefore arises, is the incidence of neurosis or neurotic symptoms significantly greater than that of a comparable control group? Reference to Table 2 will show that the urticaria/angioneurotic oedema group has a significantly higher incidence of neurotic symptoms than the control series. Furthermore, the incidence is higher in the non-allergic than the allergic group (see table), but it is noteworthy that the allergic group also has a higher incidence of neurotic symptoms than the control group.

PRE-MENSTRUAL INCIDENCE OF URTICARIA AND ANGIONEUROTIC OEDEMA

In 12 patients there was a definite tendency for urticaria or angioneurotic oedema to occur during the pre-menstrual period. This group was studied in detail along with a control group of urticaria patients with no pre-menstrual association. Interesting differences were found; for example, the premenstrual urticaria patients exhibit manifestations of the pre-menstrual tension syndrome in a significantly higher incidence than the control urticaria group.

The evidence suggests that the complex psychophysical changes responsible for the pre-menstrual tension syndrome (Rees, 1950) are also conducive to the development of urticaria and angioneurotic oedema.

A more detailed discussion of the pathogenesis and treatment of pre-menstrual urticaria is described elsewhere (Rees, 1957).

ALLERGY

In this paper the term allergy is used in the sense of a reaction based on antigen antibody reaction. We have already noted that there is a wide divergence of opinion regarding the incidence and importance of allergy in chronic urticaria and angioneurotic oedema.

In this study the assessment of allergic factors was based on careful history-taking together with exposure and exclusion tests with suspected allergens. Skin tests were not used in view of their well-known unsuitability and unreliability in urticaria and angioneurotic oedema patients.

The types of allergens which may cause urticaria include ingestants such as food and drugs, injectants such as medicinal preparations or insect bites, inhalants, and endogenous allergens.

Allergy was assessed as the dominant cause if it was found to precipitate the majority of attacks. If it was found to precipitate attacks in patients in whom other factors were considered dominant, it was assessed as subsidiary. If there was no definite evidence that allergy precipitated attacks, it was assessed as unimportant.

A similar method of assessment was applied to psychological and infective causes, and the results are shown in Table 3. The various combinations of aetiological factors are shown in Table 4.

Allergy was considered to be dominant in 22% and to play a subsidiary role in 13%. From Table 4 it will be seen that in a small proportion it was the sole discovered

cause, but in 17 cases assessed as being allergy-dominant there were other factors playing a precipitating role, the most common being psychological.

Allergic factors played a subsidiary role to psychological and infective causes in 10% and shared with psychological factors the main causal role in 3%.

TABLE 2.—NEUROTIC SYMPTOMATOLOGY

	Total		Controls	
	(%)		(%)	
Anxiety				
Mild	32		13	
Moderate	23	62	5	18
Severe	7		0	
Depression				
Mild	16		8	
Moderate	8	27	1	9
Severe	3		0	
Tension				
Mild	26		5	
Moderate	22	62	7	12
Severe	14		0	
Palpitations	42		3	
Excessive sweating	23		1	
Dizziness	17		14	
Fainting	14		0	
Frequency of micturition	16		0	
Trembling	23		1	
Dyspepsia	25		0	
Emotional diarrhoea	9		0	
Lassitude	25		0	
Effort intolerance	17		0	
Hypochondriasis	11		0	
Phobias	13		0	

There is evidence that some instances of urticaria due to physical agents have an allergic basis. As this is still rather controversial, physical agents are considered separately.

If it is assumed that all instances of urticaria/angioneurotic oedema brought on by physical agents are allergic, this would give a total of 55% of the group with allergic factors playing a role. Thus in 45% there is no evidence of any allergic causation.

In some of our patients, allergic factors only produced urticaria in a setting of emotional tension and will be referred to later. Clinical observations suggest a possible summative effect of allergic and emotional factors in producing urticaria in such patients.

PHYSICAL AGENTS

Physical agents such as thermal, mechanical, and actinic stimuli may in certain patients precipitate urticaria or angioneurotic oedema.

DUKE (1925) distinguished two types, viz. a contact type in which the reaction is

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refined to the area directly affected by the physical agent, and a so-called reflex type in which the reaction occurs not only at the site but also at more distant tissues, and sometimes the reaction occurs generally without any local manifestation at the point of contact. ROTHMAN and WALKER (1951) consider that these conditions have an allergic basis, as indicated by positive Prausnitz-Kustner passive transfer tests.

THERMAL AGENTS

Urticaria may be precipitated in some subjects by heat or cold. In our group, thermal factors operated in 8% (heat alone 4%, heat and cold 4%).

URBACH (1946) considers that only a small proportion of thermally precipitated urticaria can be explained by an allergic mechanism.

GRANT *et al.* (1936) presented evidence that urticaria brought on by heat, exercise, and emotion was mediated by a neural mechanism involving release of acetyl choline by reflexly or centrally stimulated efferent nerves.

LIGHT

In some patients, exposure to light will precipitate urticaria.

It has been shown that such patients are hypersensitive to light and that ultra-violet rays, in the range 2967 to 3341 ångström units with a maximum effect at 3131 ångström units, will elicit wheal formation in pathologically sensitive individuals in extremely low intensities which do not cause any visible reaction in normals (ROTHMAN, 1953).

Seven patients in our group exhibited light-precipitated urticaria. It was possible to demonstrate in these patients by covering part of the skin with titanium oxide, which acts as a light shield, that urticaria only developed on the part exposed to light.

In four of these patients, light sensitivity giving rise to urticaria was only present during periods of emotional tension. During periods in which they were calm they did not exhibit light sensitivity.

MECHANICAL STIMULI

Urticaria may develop in response to light stroking or to great pressure. The response to light stroking (dermatographism or urticaria factitia) appears within a few minutes whereas pressure urticaria develops after a latent period of 2 to 24 hr and only on the site of great pressure.

The tendency to dermatographism and pressure urticaria showed considerable variability in the same person at different times. In some women there was increased tendency to dermatographism during the pre-menstrual period.

INFECTIONS

Sometimes infective factors may play an important role in the aetiology of chronic urticaria and angioneurotic oedema.

Focal infections such as in the tonsils, teeth, sinuses, or elsewhere may be the main causative factor.

The presence of focal infections does not prove that they are causally relevant to the patient's urticaria. However, if removal of the septic focus gives rise to immediate recovery it would be suggestive of its probable causal importance.

Infective factors were considered to play a dominant role in 4 patients. Removal of the septic focus resulted in recovery in these patients.

Infections were found to be subsidiary to allergy in 4 patients and to psychological influences in 1 patient.

STRESS

The concept of stress is now widely used in the study of psychosomatic relationships. The term is usually used to denote external forces or stimuli which are strain-producing or potentially strain-producing on the individual to whom the force or stimuli are applied. The concept is only meaningful if taken in conjunction with individual susceptibility and reaction. The significance of various stimuli as stresses will not only depend on their intensity and duration, but also on properties of the individual including, *inter alia*, constitution, personality, and the effect of previous experiences and stresses. The same force may be stressful to some and not others and may be stressful at one time to the individual and not at another.

Environmental stimuli constituting stress may be prolonged or of short duration and vary greatly in intensity.

Life situations and stress at onset of the illness

The onset of urticaria or angioneurotic oedema coincided with stressful life situations in 51%. The stress was sudden and severe in 11% and prolonged in 40%. In the control group the onset of hernia or appendicitis was associated with stress in 8%.

Sudden stress

The onset of the illness followed bereavement of a loved person in 5 patients and illness or accident to loved persons in 3 patients. Sometimes the onset is dramatic, e.g. a female patient developed urticaria when her father was killed by being pulled into moving machinery at work. A mother developed urticaria immediately following an accident to her daughter, who jumped from an upstairs window and fractured both legs. Three male patients had onset of urticaria during World War II just before going into action on the battlefield.

Prolonged stress

A state of prolonged stress with its accompanying emotional reactions is a resultant of the environmental situation itself and the patient's reaction to it. There is considerable individual variability in reaction to stresses and some variability in the same person at different times.

The following roughly classifies the varieties of situations and stresses associated with the onset of urticaria in our group:

(1) Family and marital problems: interpersonal difficulties and tensions, marital discord, worry regarding health and behaviour of children, etc. = 13.

(2) Work and financial problems: unsuitability of work or conditions at work, financial difficulties, etc. = 9.

(3) Sex problems: in 5 female patients urticaria was precipitated by tension resulting from arousal and lack of satisfaction of sex desires and in 2 from conflicts regarding sex activities = 7.

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(4) Engagement difficulties: 4 female and 1 male patients developed urticaria for the first time during a period of stress with humiliation and anxiety, associated with proposed engagement and arising from objections by relatives = 5.
(5) Humiliating experiences = 4.
(6) Situations evoking marked jealousy reaction = 2.

Assessment of various life situations associated with onset of urticaria revealed a large variety of situations which did not lend themselves readily to classification into a few categories.

LIFE SITUATIONS AND DEVELOPMENT OF ATTACKS OF URTICARIA AND ANGIONEUROTIC OEDEMA DURING THE COURSE OF THE ILLNESS

In two-thirds of the group there was evidence of an association between the incidence of attacks of urticaria/angioneurotic oedema and stressful life situations during the course of the illness.

Just as in the case of life situations associated with the onset of illness, there was a large variety with no evidence of specificity.

The most common life situations associated with attacks during the course of the illness were the following:

(1) Situations involving threat to loved person by illness or accident.
(2) Problems and conflicts in relation to work, family, and marriage.
(3) Humiliating or embarrassing experiences.
(4) Situations evoking jealousy.
(5) Frustration or conflicts regarding sex drives.
(6) Miscellaneous situations involving problems for which no adequate solution was achieved.

Different workers have emphasized different types of life situations associated with attacks of urticaria. WITTKOWER (1953) considers that situations which intensify or frustrate the person's need for affection are particularly important.

Such situations were found to be important in some of our patients. Such situations include, for example, attitudes of parental rejection in case of children and in adults situations evoking jealousy, threats to a loved person by illness or injury, or loss of loved person by death.

These are all important events in a person's life and likely to be associated with marked emotional reactions. They cannot be regarded as specific, even for some urticaria patients, as precipitating factors, as they are found to exert a similar precipitating role in groups as asthma and vasomotor rhinitis patients studied by the author (REES, 1957). In some urticaria and angioneurotic oedema patients in whom psychological factors are important these situations can play an important precipitating role along with other varieties of stressful life situations.

GRAHAM and WOLF (1950) emphasized the importance of situations in which the patient felt humiliated and was unable to fight back. Such situations were in fact very important in some patients, but did not play an important role in more than 8% of the group.

We do not find a specificity of life situations associated with eruptions of urticaria. The importance of the life situation in this matter is determined only partly by its inherent strain-producing qualities, but also by the person's reaction to it.

The individual reaction will be influenced by his personality assets and deficits, his emotional needs, his specific vulnerability to the stress, and by the occurrence of preceding or coexisting stresses.

The development of attacks of urticaria or angioneurotic oedema in relation to such situations will also be influenced by the extent to which problems associated with the situation can be solved and the degree to which emotional tension is evoked, maintained, and expressed or suppressed.

Emotional precipitation

In two-thirds of the group there was a clear association between emotional changes and development or urticaria or angioneurotic oedema.

The most common emotional precipitant was anxiety and tension arising from a variety of possible causes.

Next most frequent were feelings of resentment or hostility, especially if "bottled up." Feelings of humiliation or embarrassment were also frequent precipitants in some patients.

Tension arising from arousal of sex desires without satisfaction was the main precipitant in some women. Such contrasting emotions as grief and pleasurable excitement in anticipation of going to a party, theatre, or on holiday, were associated with precipitation of attacks in different patients.

We therefore do not find any clear specificity of emotional change associated with attacks of urticaria and angioneurotic oedema.

Attacks during periods of rest

In 9 patients there was a distinct tendency for urticaria/angioneurotic oedema to develop during periods of rest in the evenings following periods of tension during work or other activities.

Ten patients showed a tendency to develop attacks during the night or early morning.

It was not possible to attribute these associations to allergic factors, and it seems possible that changes in autonomic activity may be responsible.

ASSESSMENT OF INCIDENCE AND RELATIVE IMPORTANCE OF PSYCHOLOGICAL FACTORS IN AETIOLOGY

Psychological factors were considered to play a causal role in 68% of the group. In 21% they were the sole discovered cause. In 18%, psychological factors were dominant in aetiology, with other causes also playing a subsidiary role. In 13%, psychological factors were subsidiary to allergic and infective causes.

TABLE 3.—AETIOLOGICAL ASSESSMENTS

	Allergic	Infective	Psychological
Dominant	22	4	39
Subsidiary	13	11	29
Unimportant	65	85	32

In 9%, psychological factors shared with infective or allergic factors the role of main causal agents, and in 7 patients psychological factors and physical agents were the main causes.

In the 32 patients in whom psychological factors were unimportant, allergy was dominant in 10, infection in 3, physical agents in 10, physical agents and pre-menstrual changes in 2, hyperthyroidism in 2, and no cause found in 5.

TABLE 4.—DISTRIBUTION OF AETIOLOGICAL FACTORS

Allergic factors dominant	
Allergy sole factor	= 5
Psychological factors subsidiary	= 12
Infective subsidiary	= 4
Pre-menstrual exacerbation	= 1
Infective factors dominant	
Infective factors only	= 2
Allergy subsidiary	= 1
Psychological factors subsidiary	= 1
Psychological factors dominant	
Psychological factors only	= 21
Allergy subsidiary	= 6
Allergy + pre-menstrual factors	= 3
Pre-menstrual	= 6
Infective and pre-menstrual	= 1
Physical agents	= 2
Miscellaneous	
Psychological and infective	= 6
Psychological and allergic and physical factors	= 3
Physical agents and pre-menstrual factors	= 2
Psychological and physical agents	= 7
Hyperthyroidism	= 2
Physical agents only	= 8
No cause found	= 7

COMPARISON OF PATIENTS IN WHOM ALLERGIC FACTORS WERE IMPORTANT WITH THOSE IN WHOM ALLERGY WAS UNIMPORTANT

ROTHMAN and WALKER (1951) state that chronic urticaria with no demonstrable allergen is a disease, the nature of which remains totally obscure. They suggest that such cases may prove in the future to be a type of emotional urticaria with a mechanism different from that of cholinergic urticaria.

The first 68 patients of the series were subdivided into 44 patients in whom no allergic factors were found, and 24 patients in whom allergic factors played a dominant or subsidiary role.

The allergic group has a higher incidence of allergic disorders in parents or siblings, but the difference is not statistically significant. The allergy group has a statistically significant higher incidence of individuals with normal previous mental health with stable personality, a lower incidence of marked neurotic personality traits and neurotic symptoms, e.g. moderate or severe anxiety, severe tension, lassitude, fainting, etc.

Emotional factors were found to precipitate attacks in 80% of the nonallergic group and 37% of the allergic group.

There is clear evidence that psychological factors play a greater role in patients in whom no evidence of allergic factors were found. It should be noted, however, that emotional factors play a role in some of the allergic patients who are by no means free from neurotic symptoms or marked neurotic traits of personality.

TABLE 5.—COMPARISON OF ALLERGIC AND NON-ALLERGIC GROUPS

	Allergy unimportant	Allergy important
Family history of allergic disorders in parents and siblings	20	34·6
Normal mental health previously	43	70
Childhood neurosis	20	12
Clear pre-disposition to neurosis	40	16·5
Personality:		
Stable personality	45	70
Moderately unstable	36	12
Very unstable	18	12
Very sensitive	64	29
Very anxious	50	21
Meticulous, obsessional	46	16
Schizoid, somewhat or very	18	4
Neurotic symptoms:		
Moderate or severe anxiety	48	20
Severe tension	22	0
Fainting	20	4
Frequency of micturition	20	8
Trembling	27	16
Lassitude	32	12
Clear evidence of emotional precipitation of attacks	80	37

MULTIPLE CAUSATION

The majority of the group of patients suffering from urticaria and/or angioneurotic oedema more than one aetiological factor was found to play a causative role. Out of 22 patients in whom allergic factors were considered to be the dominant cause, psychological factors were found to play a subsidiary precipitating role in 12.

Similarly, out of 39 patients in whom psychological factors were considered to be the dominant cause, 18 had allergic, premenstrual, infective, or physical agents as precipitants of some attacks.

A large variety of combinations of aetiological factors occur in the group.

Clinical evidence suggests that when more than one causative factor is present, they do not necessarily act independently of each other.

Two patients developed urticaria on taking aspirin only during periods of emotional tension associated with stressful life situations. Both these patients were able to take aspirin without development of rash at other times. This is of particular interest, as aspirin-sensitivity is an allergic phenomenon.

The occurrence of solar urticaria only during periods of stress has already been referred to.

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Patients with pre-menstrual urticaria are notable for the marked multiplicity of factors in operation, and that these appear to give additive effects (REES, 1957).

There is thus considerable clinical evidence to suggest that various causal agents can exert summative or possibly synergic effects in producing urticaria or angioneurotic oedema. Possible physiological explanations of such inter-relationships will be considered later.

DISCUSSION

The results of the present investigation reveal that a variety of causal agents operate in the development of urticaria and angioneurotic oedema. In the majority of patients a multiplicity of causative factors exists with allergic, physical, psychological, infective, and other factors, in various combinations.

Thus, any theory of the pathogenic mechanism involved must take into account the diversity of precipitating causes involving different pathways and mechanisms and also the inter-relationships between different causal agents.

Allergic factors could not account for all patients in the group. Some 35% had allergic reactions to ingestants, injectants, and other extrinsic allergens.

Even if we add to the patients in whom physical agents precipitated attacks, we still have 45% in whom no evidence of allergic (including physical precipitation) could be found.

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According to ROTHMAN and WALKER (1951), some of the patients with urticaria brought on by physical stimuli, such as heat, cold, mechanical force, and solar radiation, have an allergic basis, as indicated by the positive Prausnitz-Kustner passive transfer reactions; e.g. it has been shown that the injection of serum of a sensitized patient into the skin of a normal individual as a control, followed by the application of the specific physical agent to the site of the injection, results in urticaria.

ROTHMAN and WALKER (1951) believe that certain individuals become sensitized to physiological metabolites and develop antibodies to the respective substances, formed by various physical stimuli, and that these antibodies are highly specific for each physical modality.

LEWIS (1927) demonstrated that urticarial wheals could be explained on the basis of the "triple response" resulting from release into the skin of histamine or a similar "H" substance.

In support of this theory are the experiments of KATZ (1942), who reported the recovery of histamine from perfused denuded skin following the injection of an allergen, and the findings of PIQUET (1946) that the histamine level in urticarial papules increases followed by a fall to subnormal levels in 6 hr.

There is strong evidence to suggest that acetyl choline may be the chemical mediator in certain forms of urticaria.

In 4 patients (2 men and 2 women) in our series, the urticarial eruption occurred mainly or entirely on the face, neck, or upper chest, i.e. the blushing area. The attacks of urticaria in these patients were predominately emotionally determined.

ROTHMAN and WALKER (1951) mention the tendency of some patients who blush easily to develop generalized urticaria in emotional excitement or to heat. In these patients, according to ROTHMAN and WALKER (1951), the response of the skin to acetyl choline liberated in response to emotional tension and heat is pathologically altered. In these individuals, acetyl choline not only causes increased arteriolar

dilation (blushing), which is physiological, but, also urticaria, which is a pathological response by the skin to physiological amounts of released acetyl choline.

GRANT, PEARSON and COMEAU (1936) carried out some brilliant experiments on patients with urticaria precipitated by emotion, heat, and exercise. They found that nerve blockage prevented the usual urticarial response to the distant application of heat and that occlusion of the circulation did not have a similar effect, that cholinergic drugs produced generalized urticaria, and that these effects were blocked by atropine. The mechanism underlying this type of urticaria was considered to be release of acetyl choline by cholinergic nerve fibres. This work has been confirmed by HOPKINS, KEATON and HAZEL (1938).

Cholinergic urticaria appears to be a well-defined clinical entity, but is considered to be rather rare (SHELDON *et al.*, 1954). It should be noted that MORGAN (1953) found that the lesions fail to appear in histamine-exhausted skin areas, so that there is a possibility that cholinergic urticaria may be mediated by the histamine released by acetyl choline. Acetyl choline can produce arteriolar dilatation and (probably through the mediation of histamine liberation) the full triple response. MORGAN (1953) also showed that patients with cholinergic urticaria have a moderately reduced level of blood cholinesterase.

The 4 patients in our series with urticaria confined to the blushing area did not develop attacks in response to heat, so that the underlying mechanism may not be identical.

Both histamine and acetyl choline can give rise to whealing, and it is possible that either, both, or an unidentified substance may mediate wheal formation in different patients.

The pathophysiology of whealing, according to ROTHMAN (1953), involves two distinct changes:

(1) Local vasodilation.

(2) Locally increased capillary permeability.

The whealing is caused by the passage of plasma into the extra-cellular spaces of the papillary and subpapillary layers of the skin. Increased blood-flow is essential for whealing, and if stasis is produced by external pressure, wheal formation is impeded as soon as external pressure approaches systolic blood-pressure.

CHAMBERS and ZWEIFACH (1944) have shown that vasodilation itself increases filtration of plasma into the tissues without the capillary wall being qualitatively changed.

The factors influencing vasodilation should therefore now be considered. From the psychosomatic viewpoint the most important vasodilator impulses to the skin are the so-called "antidromic impulses." The fibres conveying antidromic vasodilator impulses have their nutrient cells in the posterior root ganglia and run along the posterior nerve roots and sensory nerves.

The vasodilation produced by antidromic stimulation gradually develops and gradually passes off, suggesting that the nerve impulses act through the liberation of metabolites. DALE and GOODMAN (1930) suggested that the substance was acetyl choline. WYBAUW (1936) was able to prove that antidromic vasodilation is associated with release of acetyl choline peripherally. ROTHMAN (1953), however, points out that the difficulty in accepting acetyl choline as the only mediator is the relatively strong duration of the vasodilation, in view of the fact that liberated acetyl choline

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is rapidly broken down by cholinesterase. LEWIS (1927) had suggested that acetyl choline acted in cells liberating the more stable histamine or "H" substance. KWIATOWSKI (1943) brought forward evidence for the presence of histaminergic fibres as possibly responsible for antidromic vasodilation, whereas HELLAUER and UMRATH (1947 and 1948) isolated a substance from posterior nerve roots which gave rise to prolonged vasodilation which was neither histamine nor acetyl choline. Vasodilation can also be caused by an axon reflex mechanism. The nature of the chemical mediator of the axon reflex is not known; acetyl choline, histamine, and the substance of HELLAUER and UMRATH (1947) have been suggested.

In our group we have found that mechanical stimulation such as mechanical pressure, thermal changes, and actinic stimuli can produce urticaria in some patients. In these patients, urticarial reactions are produced by comparatively low intensity of stimulation which on normal subjects would produce no such reaction. This suggests the possibility that urticaria patients may be hypersensitive to normal metabolites such as acetyl choline or histamine.

In this connection it is interesting to note that GRAHAM and WOLF (1950), using iontophoresis of weak histamine solution and pilocarpine in urticaria patients and controls, found that urticaria patients had a greater degree of sensitivity than the controls to both drugs.

If it is established that the response of the skin and deeper tissues in urticaria and angioneurotic oedema to acetyl choline and/or histamine is pathologically increased, it would explain why the disorders can be produced by external stimuli as well as internal stimuli.

It may be possible that, in the psychogenic forms of these disorders, responses are evoked by amounts of acetyl choline or histamine liberated by emotional tension which would not produce effects in normal subjects. In other words, the specificity of response to emotional stimuli may be determined mainly by the increased sensitivity of the skin and tissues rather than to an increased liberation of chemical mediator.

This would provide an explanation of the possible mechanism whereby urticaria and angioneurotic oedema may be precipitated by a variety of stresses and a variety of emotional changes.

The role of personality, general stability, and capacity for adjustment in the aetiology of urticaria/angioneurotic oedema, appears to be mainly indirect, and determined by the extent they contribute to the development of emotional tension, which in turn influences autonomic reactions and neural mechanisms such as antidromic stimulation and vasomotor instability.

THERON (1948), from factorial studies, concluded that there were two main factors determining peripheral vasomotor reactions, viz. basic emotional tension and emotional lability-stability of the subject. This fits in with our findings of the role of emotional factors and also the greater incidence of unstable persons in urticaria/angioneurotic oedema patients than controls.

The evidence suggests that allergic, infective, psychogenic, and physical stimuli produce urticaria or angioneurotic oedema by a common pathogenic mechanism involving local vasodilation and locally increased capillary permeability in response to chemical mediators such as acetyl choline, histamine, or a third, as yet, unidentified substance. Such a pathogenetic mechanism would explain the complex interplay of a large variety of different causal agencies in the aetiology of the disorder.

SUMMARY

(1) A series of 100 unselected cases of urticaria and/or angioneurotic oedema of over 3 months' duration were studied from physical and psychological aspects in order to determine the relative incidence and importance of various causative agents in these disorders. A control group of 100 subjects of similar age and sex distribution was assessed by the same standards and criteria.

(2) There was a differential sex incidence with female-male ratio being approximately 2 : 1.

(3) The group consisted of 76 patients with urticaria only, 16 patients with angioneurotic oedema only, and 6 patients with both manifestations.

Comparison of aetiological factors in urticaria and angioneurotic oedema showed no significant differences, thus supporting the view that they are manifestations of the same disorder and not distinct nosological entities, as suggested by some authorities.

(4) Multiple causation was found to be the general rule. Allergic factors played a role in 35%, psychological factors in 68%, infective factors in 14%, physical agents in 21%, and in some women premenstrual changes played a precipitating role.

A large variety of sequences and combinations of causal factors was found.

(5) In many cases, physical and allergic factors only produced symptoms when associated with stress and emotional tension, and not at other times.

(6) Comparison of patients in whom allergy played a role with those in whom allergy was considered unimportant revealed interesting differences, the nonallergic group having a significantly higher incidence of neurotic personality traits, neurotic symptoms, and higher incidence of emotional precipitation of attacks.

(7) The group as a whole showed a statistically higher incidence of neurotic symptoms than the control group.

(8) There was no specific personality type found to be associated with chronic urticaria or chronic angioneurotic oedema. Certain personality traits, however, occurred in statistically significantly higher incidence in urticaria/angioneurotic oedema patients than controls, viz. general instability, sensitiveness, and cyclothymic traits.

(9) The onset of the disorder coincided with stressful life situations in 51%. These are analysed, and no evidence of specificity found.

(10) Emotional precipitation of attacks was found in 68%. A variety of emotional changes were responsible with no evidence of specificity. Suppression or inadequate expression of emotions was found to be more important than type of emotion experienced.

(11) The pathogenesis of these disorders is discussed and possible physiological and chemical mechanisms for the complex inter-relationship and inter-dependency of various causal agents are described.

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PEPTIC ULCER AND MENTAL DISORDER—I*

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INTRODUCTION

IT HAS recently been possible to investigate the incidence of peptic ulcer amongst a number of patients suffering from various psychiatric disorders. The results are now presented in such a way as to throw light on two different problems: the one is endemiological, and the other has to do with a possible association of peptic ulcer with a particular kind of mental disorder.

Whenever a study is made of the influence on the incidence of peptic ulcer of various factors, such as sex, age, or occupation, the objection can always be raised that the population studied is not representative of the population at risk. This objection is difficult to meet in such endemiological studies, but its force can be progressively diminished if it can be shown that the same factors influence the incidence in the same way in one population after another. The present population has been selected entirely on the basis of psychiatric illness, and it is interesting to see whether aetiological factors found to be of importance in other populations are of similar importance in this one. The results as they bear on this problem are presented in the first part of this paper.

The second problem is to discover whether peptic ulcer is more commonly associated with one kind of psychiatric disorder than another, after taking into account any factor found to influence considerably the incidence of ulcer (in particular, sex and age). The results are presented in the second part of this paper.

POPULATION INVESTIGATED

The population investigated consisted of all the male patients between the ages of 16 and 65 discharged from in-patient treatment at The Bethlem Royal and Maudsley Hospitals, London, during the years 1950 to 1954 inclusive.

These two psychiatric hospitals share a common staff and records system, although they differ to some extent in the medical facilities they offer, and therefore in the types of case admitted; for example, in one there is a unit chiefly concerned with epileptic disorders and in the other a unit devoted to the treatment of schizophrenics with insulin coma. Both hospitals only admit cases either as ordinary hospital patients or as voluntary patients under Section 1 of the Mental Treatment Act of 1930. There are no patients, therefore, detained under certificate and very few who have become institutionalized or severely deteriorated in their mental state. Because of the unusually full facilities for clinical investigation and because of the emphasis laid on the teaching of psychiatric staff, an attempt is made to keep the turnover of patients as large as possible. The average duration of stay amongst 1397 male patients in the 3 year period 1949 to 1951 was 3·6 months, and only 1·4% stayed

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longer than a year. It is therefore clear that the population studied, while mentally disordered to some extent, is by no means typical of that to be found in most mental hospitals. Despite handicaps of varying severity, most patients are discharged back to their homes. Admittedly a few soon after discharge need the more or less permanent care of a mental hospital, although at the time of their admission the prospects of them being able to lead independent lives again seemed fairly good. Similarly, a few patients have already spent some time in a mental hospital before coming to the hospitals, but invariably they have shown enough recovery in the meantime to carry on their lives outside hospital.

The incidence of peptic ulcer in general is found to differ in the two sexes, being higher amongst men. To facilitate the collection of an adequate number of ulcer cases, therefore, the investigation was restricted to the male sex. If a patient was readmitted and discharged a second time within our 5 year period or was transferred from one of the two hospitals to the other, the case was counted only once. In all there were 2202 men in the survey. Of these, 86 (3·9%) were excluded because their case-notes could not be traced. There was no concurrent investigation into dyspeptic conditions being done at the hospital, and there seems to be no reason why the omission of these cases should bias the results. Likewise, in 49 cases (2·3%) of those with notes available, the records were insufficiently detailed for the purposes of this survey. Thus full information was available on 2068 men between the ages of 16 and 65 discharged from these two psychiatric hospitals during the 5 year period 1950–1954.

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METHOD

The names of all the eligible patients were taken from the hospital register. The case-notes of each patient were then obtained and the following information was extracted and recorded on a card:

(1) *Age*. The age given on the front of the case-notes was that of the patient at the time of his admission to hospital; it was easy to find and was the one used in this survey. Although a patient was included in the survey according to the date of his discharge from hospital, with so short an average length of stay his age on discharge would be very little greater than his age on admission. A lower age limit was set at 16 because patients younger than this in these hospitals are treated in a special children's unit and their case-notes were not readily available. An upper age limit was set at 65 because above this age dysmnesic illnesses become so common, and a life-long companion to corroborate evidence is so often lacking, that a reliable past medical history cannot be obtained. The recorded age was assigned to one of five decades:

16–, 25–, 35–, 45–, 55–65

(2) *Occupation*. The most recent occupation of the patient was discovered from the case-notes and was assigned to one of thirteen categories. These categories were constructed so as to separate out as far as possible groups likely to have a high or a low incidence of ulcer according to the studies of Doll and Avery-Jones (1951) and others.

The thirteen categories were as follows:

A, doctors;
B, other professions;
C, managers and business executives;
D, foremen;
E, transport workers (drivers and conductors);
F, clerks;
G, other skilled workers (excluding agricultural);
H, semi-skilled workers;
I, unskilled workers (excluding agricultural);
J, agricultural workers;
K, students;
O, unemployable;
X, no information.

Enough information was not always available to be certain to which category a given case should be assigned. For example, it might not be clear from the case-notes whether a shopkeeper owned the business and would therefore be a business executive (C), or was an employee and would therefore be a skilled worker (G); or again, it might not be clear whether a skilled engineer was in fact a foreman (D), or not (G). Most of the errors of classification made were errors of omission: that is, it is very unlikely that anyone who was not a foreman was classified as (D), although it is quite possible some foremen were classified in lower categories. At the time the patient was interviewed and the case-notes prepared this particular piece of research was not in mind, so that enquiry into the patient's occupation was not always carried very far; nevertheless, with whatever information was available the case was assigned to one of the thirteen categories before anything else was known about the case except the age. Despite the inaccuracies of the method, no bias is likely to have been introduced except one to nullify the influence of any occupational factor.

(3) *Residence.* The address given by the patient was noted and was classified as urban, rural, or foreign according to the usage of the Registrar-General in the Statistical Review of England and Wales for the year 1951.*

There was probably a tendency for more cases to give a London address than actually lived in London. Mentally distraught individuals sometimes wander off in an attempt to find relief in another environment. Londoners who moved out of town in this way would be unlikely to appear in these hospitals; whereas some people from the provinces who sought help from relatives or in rooming-houses in London would be included in our figures. But from reviewing the notes the impression gained was that this number was small; the vast majority of cases, being socially competent until shortly before admission, gave the address where they actually lived.

(4) *Final psychiatric diagnosis.* On the front sheet of the case-record is recorded the final diagnosis in the form laid down in the International List of Diagnoses and Causes of Death (Geneva, 1947). Not infrequently two or more diagnoses are stated, but only one was used for the purpose of the present study. The emphasis here was more upon the reaction type, as the concept has been developed by the school of ADOLF MEYER, than upon the constitutional endowment of the individual or the formal, descriptive features of the illness; so that when more than one diagnosis was stated, that one was selected that indicated the type of the reaction displayed. For example, an anxiety state (310) in an inadequate personality (320·3) was classified as an Anxiety State (310); or, prominent depersonalization (318·1) in the setting of a reactive depression (314) was classified as Depression (314). Only when there was no alternative in the stated diagnoses was the more constitutional or descriptive aspect used.

(5) *Presence or absence of a peptic ulcer.* In the summary of the case, or in the body of the case-notes, there is a section headed past medical history, and in this hospital an attempt is usually made to corroborate the patient's statements with those of a friend or relative. Although enquiry is always made about serious illnesses in the past, direct questioning about dyspepsia would be carried out only if there were some clinical indication for it. In most cases this section contains some positive items of information, e.g. "pneumonia aged 21, appendicectomy aged 30, winter bronchitis since age 45". Occasionally, particularly in younger patients the only information is "No serious illnesses", or some such remark.

In the present climate of opinion, when psychosomatic disorder is so often mentioned in medical circles, it seems improbable that in a psychiatric history there would be a failure to record the fact that the patient stated he had had a peptic ulcer. Nevertheless, this is possible, as is also the chance that a mentally distressed patient failed to mention his peptic ulcer of some years ago.

When the case-notes from different units in the hospital were compared, it was found that though they varied considerably in bulk from one unit to another, there was a surprising uniformity in the amount of detail shown in the section devoted to the past medical history. When the number of past medical illnesses recorded per decade of life completed for each patient was compared in a consecutive series of 350, very little difference was shown between the notes taken on the different units. WRETMARK (1953) has brought forward some suggestive evidence on this point. In Sahlgren's Hospital in Gothenburg he arranged for all patients seen over a 12 month period to be questioned directly about a history of peptic ulcer. He found that the number of ulcer cases discovered, about 35, to be no greater than the annual rate of incidence for the previous 4 years when only physical illnesses in general had been enquired into. Unfortunately, a direct test of this point in which a

* H.M.S.O., 1953.

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random selection of cases were questioned more closely regarding any history of dyspepsia was not possible in the present study. The possibility remains, therefore, that with some patients, for example schizophrenics, there is a failure to elicit and record the fact that the patient has had an ulcer. This point will be discussed further in Part II of this paper.

There is evidence, however, that when patients state they have suffered from an ulcer they are correctly reporting the opinion of their medical advisers. In the present series the patient's statement was confirmed by a hospital report in all of 20 cases investigated in this way, although one man confused the site of the ulcer. Similarly, amongst psychiatrically normal men actively employed in various industries but questioned specifically about any history of dyspepsia, DOLL and AVERY JONES (1951) found that in only 12 out of 216 men (6%) did hospital evidence fail to confirm the man's account.

The term peptic ulcer is used to denote ulceration of the walls of the upper part of the gastro-intestinal tract and includes ulcers of the oesophagus, stomach, duodenum, jejunum, and Meckel's diverticulum. As the vast majority occur in the stomach and duodenum, it is to lesions in these two sites that our attention is directed. Despite some difficulty in deciding how ulcers at the pylorus should be classified, there is much to show that ulcers of the stomach and duodenum differ in many respects other than their site. They have been found to differ in their age and sex incidence; they tend to occur in personalities that differ in certain respects; familial factors seem to play a more important part in duodenal than in gastric ulcers; the ratio of gastric ulcers to duodenal ulcers appears to be changing in the course of time, and is reported concurrently to be very different in different countries (AVERY JONES, 1952; WRETMARK, 1953). They can usefully be considered, therefore, as different clinical entities, and in such a study as the present one, a distinction should be made between the two principal types of ulcer, lest an important aspect of one be masked by a contrary aspect of the other.

Unfortunately, this important distinction could not be sustained in this study. As the investigation was made retrospectively, sufficient details to allow the distinction to be made were often lacking. As an illustration, 25 cases claiming to have had an ulcer were selected at random. In 19, evidence was forthcoming on enquiry from various general hospitals that the patients were correct in their claims, and when the site of the ulcer was uncertain, evidence became available to settle the point. In one case the patient was wrong in the site he named; in one case of haematemesis occurring during the war period investigation had never been carried out to determine the exact site of the bleeding; in one case the patient was now dead and the case-notes did not state at which hospital the ulcer had been diagnosed and where, therefore, further details might be found; in a further 3 cases records relating to the ulcer had been destroyed by enemy action. Thus in 25 cases there was no way of ascertaining the site of the ulcer in 5. In view of the limited number of cases available for the survey as it was, it was thought better to include all ulcers irrespective of certainty about their site than to reduce the number of ulcers by about 20%. If a similar survey becomes possible on much larger numbers, then such a distinction would be most valuable.

The case-notes failed to provide some part of the required information in 48 cases (2·3% of the case-notes available). The reasons for this were as follows:—

(1) The patient was too inaccessible in 25 cases, in which the diagnosis was schizophrenia (10), organic cerebral disease (9), mental defect (3), hysteria (2), and mania (1).

(2) The patient stayed too short a time for a full history to be taken in 15 cases, the diagnosis being alcoholism (6), schizophrenia (5), anxiety state (3), and paranoid personality (1).

(3) The case notes were too voluminous and inadequately summarized in 5 cases; four of these had undergone lengthy psychotherapy.

(4) The histories had been too poorly recorded in 3 cases.

RESULTS AND DISCUSSION

(1) *Sex.* As the survey was restricted to males, no information is available regarding the influence of sex on the incidence of peptic ulcer in our population.

TABLE 1.—THE INCIDENCE OF PEPTIC ULCER IN PSYCHIATRIC PATIENTS ACCORDING TO AGE

Age years	Number of men examined	Number of men with ulcer	Incidence of ulcer (%)
16–	334	3	0·9
25–	603	14	2·3
35–	455	21	4·6
45–	382	50	13·1
55–65	294	33	11·2
Total	2068	121	(5·9)

(2) *Age.* The frequency of a history of peptic ulcer in men according to the five decades of life investigated is shown in Table 1. The incidence for all age groups together is 5·9%, and the distribution by age is very similar to that found in studies of mentally healthy individuals, with a peak in middle life and a slight drop in the sixth decade. This drop, though small, appears to be a fairly constant finding; it may be due in part to the removal of cases by death, since peptic ulcer becomes a more lethal disease with advancing years, and in part to the fact that the older members of the population passed their susceptible years before the noxious environmental

TABLE 2.—THE INCIDENCE OF A PROVED PEPTIC ULCER IN WORKING MEN ACCORDING TO AGE (AFTER DOLL AND AVERY JONES (1951))

Age years	Number of men examined	Number of men with ulcer	Incidence of ulcer (%)
16–	499	5	1·0
25–	1128	31	2·7
35–	1375	78	5·7
45–	1089	84	7·7
55–65	625	43	6·9
Total	4716	241	(5·1)

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influences reached their present strength. In a study carried out recently by DOLL and AVERY JONES (1951) in England on working-men, a similar incidence of ulcer was found for the various age groups. Their results are shown in Table 2; proved ulcer cases are those in which there was either a haematemesis, or radiological or operative confirmatory evidence.

(3) *Residence*. When it has been possible to study the influence of residence on the incidence of peptic ulcer, the results have usually shown a higher incidence in urban than in rural areas, (MORRIS and TITMUSS, 1944).

TABLE 3.—THE INCIDENCE OF PEPTIC ULCER ACCORDING TO AGE AND URBAN OR RURAL RESIDENCE

Age years	Urban residence		Rural residence		
	Number of men examined	Number of men with ulcer	Number of men examined	Number of men with ulcer	Expected number of men with ulcer
16–	305	3	25	0	0·22
25–	562	14	30	0	0·70
35–	427	21	24	0	1·12
45–	356	46	25	3	3·21
55–65	284	33	10	0	1·12
Total	1934	117	114	3	6·37

In our series we were able to examine this point provided we neglected 20 men, including one with an ulcer, who came from overseas, and who could not be strictly classified by our criteria as either urban or rural. Leaving these men out of account, the partition of the remainder into urban and rural residents in the various age groups is shown in Table 3. In the last column is shown the number of cases of ulcer expected in each age group amongst rural residents calculated from the

TABLE 4.—THE INCIDENCE OF PEPTIC ULCER ACCORDING TO URBAN AND RURAL RESIDENCE COMPARED WITH THE INCIDENCE EXPECTED FROM THE ENTIRE SERIES, AGE BEING TAKEN INTO ACCOUNT

Observed incidence				Expected incidence			
Residence	Ulcer	No ulcer	Total	Residence	Ulcer	No ulcer	Total
Rural	3	111	114	Rural	6·4	107·6	114·0
Urban	117	1817	1934	Urban	113·6	1820·4	1934·0
Total	120	1928	2048	Total	120·0	1928·0	2048·0

$\chi^2 = 2{\cdot}022, \quad n = 1, \quad 0{\cdot}10 < P < 0{\cdot}20$

number of men examined and the number of ulcers found in that same age group in the entire series irrespective of residence. For example, in the 16–25 age group in the entire series there were 3 ulcers found amongst 330 men examined; this gives an expected incidence of ulcer amongst 25 rural residents of 0·22; when the same is done for each age group and the expected incidences are summed, we get a total of 6·37. If, then, residence made no difference to the incidence of ulcer, for a group of men with the age structure of our 114 rural residents, we would expect 6·37 cases of ulcer. In fact, only 3 ulcers were observed.

This result is in line with the experience of others, i.e. that the incidence of ulcer is higher amongst urban residents than amongst rural. Although the numbers are very small, some idea of their significance can be got from calculating χ^2 according to the data in Table 4. From this it appears that the difference though in the expected direction is of a magnitude that fails to reach even the 10% level of confidence.

TABLE 5.—THE INCIDENCE OF PEPTIC ULCER AMONG PYSCHIATRIC PATIENTS ACCORDING TO OCCUPATION, COMPARED WITH THE INCIDENCE EXPECTED FROM THE ENTIRE SERIES, AGE BEING TAKEN INTO ACCOUNT

Occupation	Number of men	Ulcers seen	Ulcers expected (corrected for age)	χ^2	Probability
D. Foremen	67	11	5·6	6·043	$0{\cdot}01 < P < 0{\cdot}02$
F. Clerks	271	20	14·5	2·516	$0{\cdot}10 < P < 0{\cdot}20$
H. Semi-skilled workers	193	15	11·8	1·019	$0{\cdot}20 < P < 0{\cdot}30$
C. Executives and managers	197	18	15·9	0·348	$0{\cdot}50 < P < 0{\cdot}70$
E. Transport workers	42	5	3·0		
K. Students	75	3	1·0		
A. Doctors	49	3	3·1		
O. Unemployable	36	0	1·2		
J. Agricultural workers	30	0	1·2		
I. Unskilled workers	249	9	13·4	1·745	$0{\cdot}10 < P < 0{\cdot}20$
G. Skilled workers	636	29	37·0	2·621	$0{\cdot}10 < P < 0{\cdot}20$
B. Other professions	223	8	13·5	2·799	$0{\cdot}05 < P < 0{\cdot}10$
Total	2068	121	121·2		

$\chi^2 = 22{\cdot}843, \quad n = 11, \quad 0{\cdot}01 < P < 0{\cdot}02$
or, when occupational groups E, K, A, O, and J are combined:
$\chi^2 = 15{\cdot}151, \quad n = 7, \quad 0{\cdot}02 < P < 0{\cdot}05$

(4) *Occupation.* Our material was classified into twelve occupational groups (including one group "unemployable"), and the incidence of ulcer was noted in each and for each of the five age groups. These figures may now be compared with the number of ulcers expected from the experience of the entire series irrespective of occupation, but in a group having the same age structure as the occupational group under consideration. The results are shown in Table 5. When the χ^2 test is applied to the number of men with and without ulcer in all the occupational groups together, we obtain:

$$\chi^2 = 22{\cdot}84, \quad n = 11, \quad 0{\cdot}01 < P < 0{\cdot}02$$

It may be objected, however, that such a test is valueless when some of the expected frequencies are so small. So combining occupational groups E, K, A, O,

and J together, we get 11 ulcers observed amongst 232 men when 9·5 would be expected. We then get for the whole table:

$$\chi^2 = 15{\cdot}15, \qquad n = 7, \qquad 0{\cdot}02 < P < 0{\cdot}05$$

It can therefore be concluded that the differences taken all together are too great to be reasonably attributed to chance.

TABLE 6.—THE INCIDENCE OF PEPTIC ULCER AMONGST FOREMEN COMPARED WITH THE INCIDENCE EXPECTED FROM THE ENTIRE SERIES, AGE BEING TAKEN INTO ACCOUNT

Observed incidence				Expected incidence			
Occupation	Ulcer	No ulcer	Total	Occupation	Ulcer	No ulcer	Total
Foremen	11	56	67	Foremen	5·6	61·4	67·0
Others	110	1891	2001	Others	115·4	1885·6	2001·0
Total	121	1947	2068	Total	121·0	1947·0	2068·0

$\chi^2 = 6{\cdot}043, \qquad n = 1, \qquad 0{\cdot}01 < P < 0{\cdot}02$

If the groups are considered individually, we may calculate the probability of obtaining the difference between the observed and expected values by means of the χ^2 test, the experience of each group separately being compared with that of the rest of the survey. For example, the probability of obtaining the frequency observed for foremen can be obtained from the data shown in Table 6; whence $\chi^2 = 6{\cdot}043$, which for one degree of freedom gives $0{\cdot}01 < P < 0{\cdot}02$. These probabilities are given in the last column of Table 5 for each occupational group that is large enough for the method to be used.

From Table 5 it appears that only in the group of foremen is the difference too large to be reasonably attributed to chance. Leaving the factor of age out of account, foremen represent 3·2% of the survey but account for 9·1% of the ulcers; moreover, 16% of foremen have ulcers, whereas the corresponding figure for the whole survey is 6%. It must be remembered, however, that the assigning of each case to one or other of the occupational groups was done retrospectively and without the possibility of being very accurate. In this way a positive result such as this gains in significance, while a negative result carries little weight.

We may use these data in an attempt to confirm the conclusions reached by DOLL and AVERY JONES (1951) in respect of the effect of occupation on the incidence of ulcer. They examined a large number of men working in particular occupations that previous studies had suggested might have some effect. Their population, therefore, was one of working-men, while ours was one of patients receiving psychiatric treatment in hospital.

They found a significantly high incidence amongst doctors, foremen, executives, and a residual group of unskilled workers. They believed that in the first and last groups the result was spurious, in doctors because of the extreme availability of diagnostic facilities and in the unskilled workers because of a shift to sheltered employment of men with chronic dyspepsia.

In the present investigation the two groups, foremen and executives, showed a higher incidence of ulcer than in the series as a whole, thus confirming the findings

of DOLL and AVERY JONES (1951). When these two groups are combined together, we get an observed incidence of 29 against an expected incidence of 21·5; this difference is in the predicted direction although it is not in itself of a magnitude that is statistically significant.

$$(\chi^2 = 3{\cdot}446, \qquad n = 1, \qquad 0{\cdot}05 < P < 0{\cdot}10).$$

DOLL and AVERY JONES (1951) also found a low incidence of ulcer amongst agricultural workers and possibly amongst a group of sedentary workers consisting of clerks, administrative and executive civil servants, professional research workers, and a heterogeneous group of men mostly students and draughtsmen. The number of agricultural workers in the present material is so small that no useful information can be contributed on this point. If we construct a group of sedentary workers by combining our groups of clerks, students, and other professions, we get an observed incidence of ulcer of 31 against and expected incidence of 29·0. DOLL and AVERY JONES (1951) put forward their finding regarding this occupational group only very tentatively, and in our series no confirmatory evidence is forthcoming.

It is noteworthy that in the three categories of occupation that they found to have a definitely high or low incidence of ulcer, namely, foremen, managers, and agricultural workers, we have either no information to contribute or clear confirmation.

That foremen and managers carry greater responsibilities than most is obvious; that a high incidence of ulcer appears in these two occupational categories certainly suggests some connection between peptic ulcer and the bearing of responsibilities. Whether this connection is that the anxieties resulting from responsible work are a contributory cause of the ulcer, or that the personality of the ulcer-prone individual tends to lead him to assume greater responsibilities than most, or that some other common factor is at work, cannot be decided from such a study as the present one.

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SUMMARY

(1) In a survey of 2068 male patients in a psychiatric hospital the frequency with which a history of peptic ulcer was given was studied in respect of age, residence, and occupation.

(2) The results showed an increased incidence of peptic ulcer amongst men in the fifth and sixth decade of life compared with younger men; amongst urban dwellers compared with rural; and amongst foremen compared with other occupations.

(3) These results confirm the findings of similar surveys of mentally healthy individuals.

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THE MENSTRUAL CYCLE AND ITS DISORDERS IN PSYCHIATRIC PATIENTS—II

CLINICAL STUDIES*

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METHOD AND MATERIAL

THE work reported here falls into four separate sections:

(1) Statistical evaluation of the degree of variability of the menstrual cycle and the occurrence of amenorrhoea in a group of 219 patients studied over a 5 year period.

(2) A follow-up study of smaller groups of psychotics in which the relationship of menstrual disturbance to the mode of onset and course of the illness is described; and secondly, a study of the relationship between psychotic behaviour disturbances and the menstrual cycle.

(3) A study of the incidence and severity of premenstrual tension and dysmenorrhoea in neurotic and psychotic groups. This section includes a study of the patient's previous gynaecological and obstetric history.

(4) A study of the effects of ECT, deep insulin, and leucotomy on the menstrual cycle.

The case material consisted of 2430 female patients, either admitted to a psychiatric hospital or else already under treatment at the hospital between 1948 and 1956. From these cases a number were selected for the purposes of the present study, by a process of exclusion on the following grounds:

(1) All patients under the age of 16 and over 46 were excluded.

(2) Patients whose illness commenced during pregnancy or the puerperium were excluded.

(3) Patients in whom general physical illness or endocrine or gynaecological abnormality existed or supervened were excluded.

(4) Patients who had received endocrine therapy were excluded.

(5) Patients in whom the short length of hospitalization precluded adequate record-taking, were excluded.

(6) Patients in whom there was any doubt about the adequacy of the case records were also excluded.

By this process of exclusion, 219 patients finally became available for study. The fact that this figure was so low (less than 10% of all the patients concerned) was largely due to the very high rate of admission of patients in the older age groups.

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1. INCIDENCE OF QUANTIFIABLE MENSTRUAL ABNORMALITY IN A GROUP STUDIED OVER A PERIOD OF FIVE YEARS

Mean length and variability of cycle

The number of cycles recorded for each patient was totalled and a mean and standard deviation from the mean calculated for each individual. These results were then averaged for the whole group, and the final figure expressed as a group mean and group standard deviation. A coefficient of variation was calculated from these results. The results in Table 1 show these values expressed for each individual diagnostic category. In Table 2 the individual diagnostic categories have been condensed into five main diagnostic groups. The distinction is an artificial one necessitated by present-day methods of classification of mental disorder. Neurotic depressions and reactive depressions have been included in the group of affective reactions.

TABLE 1.—MEAN AND S.D. FROM MEAN IN SEPARATE DIAGNOSTIC CATEGORIES

Diagnostic category	Number of cycles recorded	Mean length of cycle (days)	S.D. from the mean length of cycle	Coefficient of variation
Hebephrenia	483	30·1	8·7	28·9
Paranoia	859	30·2	8·4	27·8
Catatonia	963	30·2	9	29·8
Schiz. simplex	210	30	6·1	20·3
M.D. schiz.	271	30·9	7·9	25·5
Schizoaffective	43	29·3	4·7	16
Affective psychosis	117	30·5	8·2	26·8
Epilepsy	327	30·7	8·6	28
Mental defective	184	30·5	7·4	24·2
Anxiety states	61	28·9	5·4	18·6
Hysteria	54	29·5	6·7	22·7
Neurotic depression	53	30·2	8·6	28·4
Reactive depression	27	30·9	8·6	27·8

Total number of cycles	3652
Mean for entire group	30·26
Standard deviation for entire group	8·1
Coefficient of variation for entire group	26·8

TABLE 2.—MEAN AND S.D. FROM MEAN IN DIAGNOSTIC GROUPS

Diagnostic group	Number of cycles recorded	Mean length of cycle (days)	S.D. from the mean length of cycle	Coefficient of variation
Schizophrenic reactions	1970	30·05	8·3	27
Paranoid reactions	859	30·2	8·4	27·8
Organic reactions	511	30·6	8·1	26·4
Affective reactions	197	30·5	8·4	27·7
Psychoneurotic reactions	115	29·2	6	20·5

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TABLE 3.—INCIDENCE OF SHORT AND LONG CYCLES IN DIAGNOSTIC GROUPS

Diagnostic group	Incidence of short cycles (0–25 days)	Incidence of long cycles (35–60 days)	Total incidence of abnormal cycles
Schizophrenic reactions	17·5%	18·6%	36·1%
Paranoid reactions	19%	18·4%	37·4%
Organic reactions	19·4%	15·9%	35·3%
Affective reactions	18·4%	21%	39·4%
Psychoneurotic reactions	23·1%	16·2%	39·3%

Analysis of results. The number of cycles recorded for each individual diagnostic category was variable, and in some instances only a relatively few number of cycles were available. For this reason only significant differences in categories where relatively equal numbers of cycles were available were considered to be meaningful, and it was felt preferable to attach more weight to the results obtained in the larger diagnostic groups.

The results for mean length of cycle show that there is very little difference between the various means in each diagnostic group. The only statistically significant difference was between the psychoneurotic and the organic group, the former showing a significantly smaller mean. Here the level of significance was not high ($T = 2$).

The variability shown by all groups, except the psychoneurotic group, was approximately the same, each group having a standard deviation in the region of 8. There were significant differences between the psychoneurotic group and all the other groups. In each case the psychoneurotic group showed significantly less variability. In all cases these differences reached the 1% level of significance as shown by FISHER's F. ratio.

Taking individual diagnostic categories, patients with schizophrenia simplex showed significantly less variability than the schizophrenic group as a whole (F. significant at 1% level).

Catatonics showed significantly more variability than schizophrenics as a whole (F. significant at 1% level).

In the organic group, epileptics showed significantly more variability than mental defectives (F. significant at 1% level.) Psychoneurotics with a depressive type of reaction showed as much variability as psychotics and significantly less variability than the neurotic group as a whole (F. significant at 1% level).

Comparison with normals. The results were compared with the figures obtained by AREY (1939) in normals. It was decided to take the figure of 29·3 days, which he obtained as a mean in 873 adults (10,360 cycles), as a basis for comparison. This was a result obtained by treating each patient's cycle individually rather than by treating the group as a single individual, and therefore probably was more meaningful. A comparison of this figure with the means obtained in the present series shows a significant increase in all means for abnormal groups, except the psychoneurotic group. A comparison of the standard deviations with that of 3·24 days obtained by AREY showed a significant increase in variability measured as standard deviation from the mean in all abnormal groups, including the psychoneurotic group.

Comparison with previous abnormals. The results were compared with those obtained by RIPLEY and PAPANICOLAOU (1943). The latter found a significant increase in the mean length of cycle and standard deviation from the mean length of cycle in all his groups (schizophrenic, depressed, and manic). These findings are confirmed in the present series, although the degree of variability is less in all groups.

Relationship to stage of illness. In order to assess whether the increased variability shown by psychiatric patients was related to the course of illness, an assessment was made of the mean length of cycle and the standard deviation from the mean for each year from admission to hospital up to 5 years, and following this a group of all cycles occurring after 5 years in hospital were taken.

TABLE 4.—MEAN AND S.D. FROM THE MEAN RELATED TO LENGTH OF STAY IN HOSPITAL FOR THE ENTIRE GROUP

Years since admission to hospital	Total number of cycles	Mean length of cycle	Standard deviation from the mean length of cycle (days)
1st year	1032	30·3	8·2
2nd year	362	30·1	8·6
3rd year	284	30·1	7·6
4th year	212	29·9	8
5th year	204	31·1	9·5
Over 5 years	1558	30·5	8·2

It will be seen that the group, as a whole, shows no particular prevailing trend either in mean or in standard deviation from year to year. All the variations shown are within the limits of a normal distribution. These results were then broken down further into the means and standard deviations for each main diagnostic group as follows:

TABLE 5.—MEAN LENGTH OF CYCLE RELATED TO LENGTH OF STAY IN HOSPITAL IN DIAGNOSTIC GROUPS

Years since admission to hospital	Schizophrenic reactions	Paranoid reactions	Organic reactions	Affective reactions	Psychoneurotic reactions
1st year	30·7 (370)	30·3 (220)	31·2 (168)	30·2 (168)	28·9 (106)
2nd year	30·6 (177)	29·9 (100)	29·2 (56)	30·5 (20)	33·7 (9)
3rd year	30·5 (177)	28·9 (95)	32·5 (12)	—	—
4th year	31·4 (124)	28·3 (74)	28 (5)	33 (9)	—
5th year	33·2 (96)	31·4 (98)	29 (10)	—	—
Over 5 years	30·7 (1026)	29·8 (272)	30·7 (260)	—	—

Bracketed figures indicate number of cycles.

TABLE 6.—STANDARD DEVIATION FROM THE MEAN LENGTH OF CYCLE RELATED TO LENGTH OF STAY IN HOSPITAL IN DIAGNOSTIC GROUPS

Years since admission to hospital	Schizophrenic reactions	Paranoid reactions	Organic reactions	Affective reactions	Psychoneurotic reactions
1st year	8·7 (370)	9·4 (220)	7·4 (168)	8·9 (168)	6·9 (106)
2nd year	9 (177)	8·1 (100)	9·5 (56)	4·2 (20)	5·8 (9)
3rd year	8·7 (177)	5·1 (95)	9·9 (12)	—	—
4th year	7·8 (124)	7·5 (74)	10·3 (5)	7·4 (9)	—
5th year	10·4 (96)	9·2 (98)	7·4 (10)	—	—
Over 5 years	8 (1026)	8·4 (272)	8·1 (260)	—	—

Bracketed figures indicate number of cycles.

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Once more, as in the group as a whole, no particular prevailing trend is shown by any of the diagnostic groups either in mean or standard deviation from the mean from year to year.

Conclusions. There is increased mean length of cycle and increased variability expressed as standard deviation from the mean, in all groups except psychoneurotics. The latter do not show an increased mean, but do show increased variability of cycle. Schizophrenics show the most significant increase in mean length and in variability of cycle, the latter being particularly marked in catatonics, and least marked in simple schizophrenics. Epileptics show significantly more variability than mental defectives. Psychoneurotics show significantly less variability of cycle than psychotics, and in particular schizophrenics, but this difference is confined to patients with anxiety states and hysteria. Neurotics with depressive types of reaction show as much variability as psychotics. The increased variability shown by all groups of patients is due to short, as well as long, cycles which occur with almost equal frequency in all groups, except psychoneurotics, who show a tendency to favour short rather than long cycles, Neither mean length of cycle nor standard deviation from the mean appears to be related to length of stay in hospital.

Amenorrhoea

The criterion for amenorrhoea was considered to be an absence of the menses for more than 60 days. Only patients in whom there was a clear indication in the record that menstruation had ceased for this period of time were included. A failure to record any menses was not considered in itself evidence that amenorrhoea had occurred. The incidence of amenorrhoea was taken to mean the occurrence of

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TABLE 7.—INCIDENCE OF AMENORRHOEA IN SEPARATE DIAGNOSTIC CATEGORIES

Diagnostic categories	Total number of cases	Case incidence of amenorrhoea
Catatonic	43	34
Paranoid	39	23
Hebephrenic	19	14
Schiz. simplex	9	8
M.D. schiz.	12	6
Schizoaffective	3	2
Affective psychoses	12	1
Mental defectives	15	5
Epilepsy	17	7
Neurotic depression	11	1
Reactive depression	5	—
Depressive reaction (nonspecific)	3	2
Anxiety states	17	2
Hysteria	7	1
Obsessional neurosis	2	—
Parkinsonism	2	1
Psychopathy	2	2
TOTAL	218	109

Incidence of amenorrhoea for the entire group 50%

amenorrhoea at any time during the patient's stay in hospital throughout the 5-year period under review. The incidence of amenorrhoea was determined in each diagnostic category, and from these results the incidence was also determined for the main diagnostic groups.

The effects of physical treatment had to be excluded, and this was achieved by only including cases of amenorrhoea not occurring within 3 months of the use of physical treatment, and in whom there had been an intervening period of at least two normal cycles following the use of such treatment.

The patients were then grouped into five main categories and the incidence of amenorrhoea was expressed as a percentage. The results were as follows:

TABLE 8.—INCIDENCE OF AMENORRHOEA IN DIAGNOSTIC GROUPS

	Total number of cases	Case incidence of amenorrhoea	% incidence of amenorrhoea
Schizophrenic reactions (including schizo-affective)	86	64	74·4
Paranoid reactions	39	23	58·9
Organic reactions (M.D., epilepsy, Parkinsonism)	34	13	38·2
Affective reactions (psychotic, reactive, neurotic and unspecified)	31	4	12·9
Psychoneurotic reactions (excluding neurotic depression)	26	3	11·5

The incidence for all psychoses was 64·2%, while that of neuroses, including neurotic depressive reactions, was 10·8%.

A chi-square test on the above frequencies showed that, as suggested by the percentage, this test was very highly significant, and that a high incidence of amenorrhoea is associated with schizophrenic patients, and a low incidence with affective reactions and psychoneurotic reactions.

Comparison with normals. Of the figures available for the incidence of amenorrhoea in normals, that of 1·9% obtained by STRACHAN and SKOTTOWE (1933) appears to be the most suitable for the purposes of comparison, in that the latter did not record amenorrhoea only in cases of long duration, as in the series of BISHOP and ORTI (1952). A comparison of the incidences obtained in the present series revealed that schizophrenic, paranoid, and organic patients all showed a statistically significant increase in incidence of amenorrhoea over normals, while both the affective and psychoneurotic groups showed a trend towards increased incidence, although this did not reach a level of significance.

Comparison with previous abnormals. In Tables 9 and 10 below, the incidences in the present series are compared with those obtained in previous series of psychiatric patients.

It is evident that there are very wide variations in the recorded incidence of amenorrhoea both in diagnostic categories and in entire groups. The criteria used for selection of these groups varied in each series. In most instances the figures are not comparable as a result of this fact. The early

TABLE 9.—COMPARISON OF INCIDENCE OF AMENORRHOEA IN PRESENT SERIES WITH PREVIOUS RESULTS

	Present series	HEYMANN	JOLLY	HANSE
Schizophrenic	74%	93% (catatonic) 50% (hebephrenic)	52% (catatonic) 48% (hebephrenic)	62% (catatonic) 50% (hebephrenic and paranoid)
Paranoid	58%	50%	9%	—
Organic	38%	—	—	—
Affective	12%	60%	51% (melancholia) 31% (manicdepressive)	60% (melancholia) 45% (manicdepressive)
Psychoneurotic	11%	—	7% (hysteria)	9% (hysteria)

TABLE 10.—COMPARISON OF INCIDENCE OF AMENORRHOEA IN PRESENT SERIES WITH PREVIOUS RESULTS

	Number of patients	Incidence of amenorrhoea
HEYMANN	450	51%
JOLLY	290	38%
HANSE	430	45%
HEALEY	243	14%
STRACHAN and SKOTTOWE	250	11%
Present series	218	50%
BISHOP and ORTI	1346	2·6%

studies by HEYMANN, JOLLY, and HANSE were performed on the chronic psychotic inmates of mental hospitals, and to that extent compare with the psychotics in the present series, but the diagnostic criteria were very different at that time, and in addition a number of cases of mild psychosis and neurosis dealt with at the present time never came to mental-hospital treatment formerly. The patients in STRACHAN and SKOTTOWE's (1933) series were all admissions to hospital, and one can, therefore, presume that they included a higher proportion of mild recoverable cases. Finally, the criteria for amenorrhoea also varied in all these series. Allowing for all these variables, certain facts still emerge. All the figures recorded for neurosis are considerably lower than those for psychosis in all the series. The incidence of amenorrhoea is greatest in schizophrenic psychoses in all series.

Relationship to stage of illness. The incidence of amenorrhoea was determined for each year from admission to hospital until twenty years later. The first five years were tabulated singly, and the next fifteen years in three groups of five. In the first table the results are given for the entire group of patients, whilst in the second table they are once more split into the five main diagnostic groups.

In order to determine the significance of these figures, a chi-square test was carried out on the incidences obtained in Table 12. This showed that during the first year in hospital the occurrence of amenorrhoea was significantly associated with schizophrenic patients and a low occurrence of amenorrhoea was associated with affective and psychoneurotic patients. For later years the incidence of amenorrhoea is largely associated with schizophrenic, paranoid, and organic patients. The latter group show a significant absence of incidence during the fourth year. The reason for this is not apparent. The curve of incidence for the whole group shows a gradual rise from time of admission to hospital up to the twentieth year following admission. The presence of mild psychoneurotic and

TABLE 11.—INCIDENCE OF AMENORRHOEA RELATED TO LENGTH OF STAY IN HOSPITAL

Years since admission to hospital	Total number of patients	Case incidence of amenorrhoea	% incidence of amenorrhoea
1st year	172	52	30·2
2nd year	59	24	40·6
3rd year	42	20	47·6
4th year	35	17	48·5
5th year	28	12	42·8
6th–10th year	77	40	51·9
11th–15th year	63	36	57·1
16th–20th year	48	26	54·1

TABLE 12.—INCIDENCE OF AMENORRHOEA RELATED TO LENGTH OF STAY IN HOSPITAL IN DIAGNOSTIC GROUPS

Years since admission to hospital	Schizophrenic reactions	Paranoid reactions	Organic reactions	Affective reactions	Psychoneurotic reactions
1st year	25 (46%)	14 (41%)	7 (24%)	3 (10%)	3 (12%)
2nd year	9 (53%)	4 (36%)	9 (39%)	2 (33%)	—
3rd year	9 (64%)	1 (25%)	8 (38%)	2 (66%)	—
4th year	5 (45%)	2 (40%)	8 (47%)	2 (100%)	—
5th year	9 (56%)	3 (25%)	—	—	—
6th–10th year	19 (50%)	10 (45%)	11 (64%)	—	—
11th–15th year	16 (53%)	10 (55%)	10 (66%)	—	—
16th–20th year	16 (64%)	8 (66%)	2 (18%)	—	—

Unbracketed figures refer to case incidence of amenorrhoea per year since admission to hospital.

Bracketed figures indicate percentage incidence of amenorrhoea per year since admission to hospital.

affective patients during the first year accounts for the lower figures of incidence at the onset. From the fifth to twentieth year in hospital there is no really significant association between incidence of amenorrhoea and any single diagnostic group. In other words, the terminal rise in incidence which is observed, although slight, is an occurrence which is not related to diagnosis specifically, and is common to all patients who remain on in hospital for a great number of years. It may well be related to menopausal factors which might be expected to affect all groups equally.

The curve of incidence of amenorrhoea during the course of functional psychoses (schizophrenic and paranoid) shown overleaf in Fig. 1 illustrates this point. By excluding mild psychoneurotic and affective reactions, an incidence is obtained which remains in the region of 50% of cases per year until, from the sixth to twentieth year, a slight terminal rise occurs.

Relationship to age. The incidence of amenorrhoea was related to age in each patient. This was obtained by dividing the patients into age groups and recording the number in each group, with and without a history of amenorrhoea, during the period under review. The results are shown in Table 13.

A chi-square test was carried out on these frequencies, but was found not to be significant. In other words, there is no evidence, beyond what could occur by chance, of association between age and incidence of amenorrhoea. Nevertheless, it is possible that the slightly higher incidence of

TABLE 13.—INCIDENCE OF AMENORRHOEA RELATED TO AGE

	Aet 16–20	Aet 21–25	Aet 26–30	Aet 31–35	Aet 36–40	Aet 41–46
Patients with amenorrhoea	9	13	19	23	25	18
Patients without amenorrhoea	7	15	21	37	17	14
Percentage incidence	56·2%	46·4%	47·5%	38·3%	59·5%	56·2%

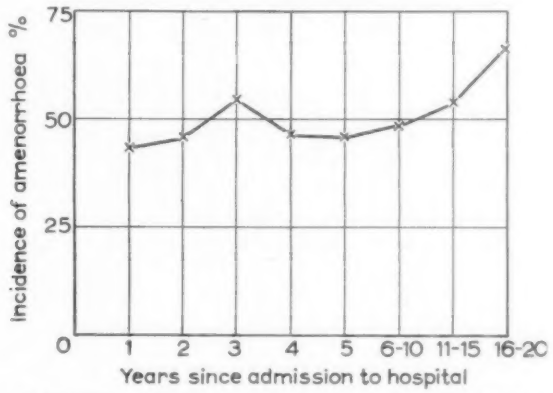

FIG. 1.—Graph of incidence of amenorrhoea related to length of illness in functional psychotics.

amenorrhoea in the younger age group, 16–20 years, and the older age group, 36–46 years, may be indicative of a trend towards increased incidence of this type of menstrual disturbance. In women whose cycle has not been firmly established (age group 16–20 years) and in those who are approaching the menopause (age group 36–46 years) a tendency towards increased incidence of amenorrhoea would not be an unexpected occurrence.

Conclusions. Amenorrhoea has been shown to occur with outstanding frequency in psychiatric patients. It is most common in patients with a schizophrenic type of reaction, as many as 74% being affected over a period of 5 years. Paranoid patients also show a very high incidence.

In affective illness the entire picture has been obscured by the advent of ECT. Formerly carrying a high incidence of amenorrhoea (40%–60%), the early treatment of all depressions by ECT has made a comparable figure unobtainable. Chronic psychotic depression following a failure to respond to ECT is evidently such a rarity in women under the age of 46 that no cases were obtainable. The significantly lower figures for incidence of amenorrhoea in affective conditions may thus be partly due to improvement in the clinical condition of the patients at an early date following admission to hospital, but is also probably associated with the present-day practice of treating patients with mild psychoneurotic and reactive depressions who would formerly never have entered hospital at all.

The incidence of amenorrhoea in psychoneurotics is not sufficiently marked for it to be considered significantly more than in a normal group.

Psychotics show a more or less uniform incidence of amenorrhoea during their stay in hospital, with a tendency towards increased incidence during later years.

This may be related to the approaching menopause. There is no close relationship between amenorrhoea and age, although the trend is such as to suggest that the middle-age groups (21–35 years) show less tendency to menstrual disturbance than the younger and older age groups (16–20 years and 36–46 years).

2. RELATIONSHIP OF MENSTRUAL DISTURBANCE TO MODE OF ONSET AND COURSE OF ILLNESS

58 psychotics, all of whom were diagnosed on admission as suffering from schizophrenic and paranoid psychoses, were followed up over a period of 2 years. The following relationships were studied:

Relationship of amenorrhoea and prolongation of cycle to:

(1) Mode of onset of the psychosis.
(2) Course of the psychosis.
(3) Prognosis.
(4) Weight.

Mode of onset. The relationship of menstrual disturbance to the mode of onset of the illness was studied. The patients were divided into three groups; those with insidious onset, those who were stuporose on admission, and those in whom symptoms had developed acutely with over-activity and disturbed behaviour. In the insidious group, 8 out of 17 patients showed an incidence of prolonged cycles and amenorrhoea (47%). In the stuporose group, all of 12 patients showed menstrual disturbance (100%). In the acute group, 18 of 29 patients showed menstrual disturbance (62%). Owing to the small numbers involved in each group, an analysis of these results by the chi-square test was not practicable. From the percentages it would appear that:

(1) Patients with a stuporose onset to the illness show significantly more menstrual disturbance than either those with an insidious onset ($T = 4$) or those with an acute and over-active onset ($T = 4$).
(2) The increase in incidence of amenorrhoea in acute and overactive patients as opposed to those with an insidious onset does not reach a significant level ($T = 1$), but it is possible that this increase does represent a trend which might become evident in a larger series of patients.

Course of illness. The pattern of menstruation was determined at the onset, during the first 3 months following admission to hospital. 33 of the 58 psychotics (Group A) were either amenorrhoeic on admission or developed amenorrhoea within 3 months of admission to hospital. 25 psychotics (Group B) showed no sign of menstrual disturbance during the first 3 months in hospital.

One year later 48 of the patients remained on in hospital. 5 had been discharged from Group A and 5 from Group B. The incidence of amenorrhoea and prolongation of cycle during the next 3 months was 78% of Group A and 35% of Group B.

Two years later 24 of the patients remained on in hospital, 12 having been discharged from Group A and 12 from Group B. The incidence of amenorrhoea and prolongation of cycle during the next 3 months was 56% of Group A and 62% of Group B.

It will be observed from a study of these proportions that those who show a disturbance of cycle at their onset of their illness show a significantly greater incidence of disturbance one year later than a group of patients who showed no initial menstrual disturbance ($T = 3$). However, after 2 years in hospital the two groups show almost identical incidences of menstrual disturbance.

It would appear that a tendency for the cycle to be disturbed remains more marked for some time in those who have initial menstrual disturbance, but that after a time the incidence of disturbance in the two groups levels up and in both then approximates to the incidence of disturbance found in psychotics in general.

Prognosis. It was decided to take the number of patients in the group who were discharged from hospital during the time of follow-up, as a factor indicating prognosis. In the first place, it was determined whether the occurrence of menstrual disturbance at the onset of the illness had any relationship to prognosis. Of the 33 patients who showed signs of menstrual disturbance during the first 3 months in hospital, 17 were discharged during the next 2 years, an incidence of 51%. Of the 25

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patients who showed no sign of menstrual disturbance at the onset of the illness, 17 were discharged during the next 2 years, an incidence of 68%. The difference between the two proportions was not sufficient for any conclusions to be reached ($T = 1{\cdot}3$), but it is possible that this difference represents a trend towards improved prognosis in those without menstrual disturbance at the onset of the illness.

It was further determined whether there was any relationship between the incidence of menstrual disturbance during the 3 months prior to discharge and prognosis. Of the 34 patients who were discharged during the period of follow-up, 20 showed an incidence of amenorrhoea and prolongation of cycle during the 3 months before leaving hospital (58%), and 14 had regular cycles (42%).

Further follow-up of these patients resulted in the following information becoming available: of the 20 patients who had disturbance of their cycle prior to discharge, 4 were described as far from symptom-free on discharge and 10 were subsequently readmitted, while of the 14 who had shown no menstrual disturbance prior to discharge only 2 were subsequently readmitted.

It would, therefore, appear that disturbance of the menstrual cycle during the 3 months before discharge was associated with a 50% relapse rate, but an absence of disturbance was associated with only 14% relapse rate.

Weight. Amenorrhoea was related to weight gain and loss in the group of 58 disturbed psychotics. The mean weight of the whole group was 111 lb. On admission to hospital the weight of those patients showing initial menstrual disturbance was compared with those who were regular.

The mean weight of the group showing menstrual disturbance did not differ significantly from that of the group who were regular.

Fluctuation in the weight chart was studied during periods of amenorrhoea and prolonged cycle. Weight-gain was as common a finding as weight-loss. In many instances there was fluctuation with both gain and loss during the period of menstrual disturbance.

It was determined whether there was any significant fluctuation in weight during periods of amenorrhoea as opposed to periods of normal cycle. The average weight fluctuation was calculated during the 41 instances of menstrual disturbance which occurred amongst the group of disturbed psychotics. This was found to be 8·3 lb for an average duration of disturbance of 182 days. In each patient with an incidence of menstrual disturbance a comparable number of days of normal cycle was recorded and the mean weight fluctuation estimated during this period. This proved to be 8·4 lb, i.e. it was evident there was no significant difference in weight fluctuation at times of menstrual disturbance as opposed to times of normal cycle.

The mean weight level for instances of amenorrhoea of 200 days or more in duration was 110·7 lb, and this did not differ significantly from the mean weight of the group as a whole. However, the individual variation in weight was considerable, the standard deviation from the mean being 28·1 lb. The standard error of the difference between this figure and the standard deviation for the group as a whole was 5·2, and the critical ratio obtained reached a significant level ($T = 2{\cdot}7$).

Conclusions. The high rate of disturbance of the menstrual cycle, which was observed in the larger group of patients in Section 1, was once more observed in a group of functional psychotics.

The mode of onset of the illness is related to the occurrence of this disturbance, which is most significantly associated with catatonic stupor. There is also a trend towards increased incidence of disturbance in patients with an acute and overactive onset to their psychosis. A high rate of initial menstrual disturbance tends to persist for a time, but after 2 years in hospital all psychotics tend to approximate to the incidence observed in the group as a whole, whether their menses were normal or absent at the onset. There is a trend towards improved prognosis in patients who do not show menstrual disturbance at the onset of their illness, but this is not marked. However, amenorrhoea or disturbance of cycle within 3 months of discharge, and providing it is not associated with the use of physical methods of treatment, would appear to be a sign of poor prognosis and to be associated with a high rate of relapse.

There is no clear relationship between weight-gain and loss and menstrual

disturbance, but increased variability of weight level is found in psychotics who have become amenorrhoeic. It is conceivable that the common factor to this relationship is the tendency of the schizophrenic to be subject to a wider variation than normal in her metabolic processes.

RELATIONSHIP OF PSYCHOTIC BEHAVIOUR TO THE MENSTRUAL CYCLE

In this section it is intended to demonstrate any existing relationship which occurs between acute psychotic symptoms and any particular phase of the menstrual cycle, and secondly any relationship between acute psychotic symptoms and subsequent disturbance of the menstrual cycle.

Psychotic disturbance related to the menstrual cycle. A group of patients who were known to be prone to disturbed behaviour were followed up over a period of 2 years. There were 22 patients in the group, of whom 4 were hebephrenics, 11 catatonics, 6 paranoid, and 1 epileptic. They were all suffering from prolonged and severe psychoses, with a record of frequent outbursts of violence and resistive behaviour. A record was taken of the day on which any disturbance occurred, and the disturbances recorded were compared with the corresponding stage of cycle. 336 separate disturbances were recorded as follows:

189 (56%) occurred during a time of normal cycle.

147 (44%) occurred during periods of amenorrhoea or prolonged cycle.

Observing the patients individually, it was found that 10 (45%) had a preponderance of outbursts during the last 10 days of the cycle. 6 patients had a preponderance during the tenth to twentieth day of cycle (27%), 4 had a preponderance during the first 10 days of cycle (18%).

A comparison of these proportions shows that significantly more patients become disturbed during the last 10 days as opposed to the first 10 days of the cycle ($T = 2$). The difference in proportion between the incidence for tenth to twentieth and twenty-first to thirtieth day is not statistically significant ($T = 1{\cdot}2$), nor is that between the first and tenth and eleventh and twentieth day ($T = 0{\cdot}72$).

By treating the group as a whole and summing up all the disturbances recorded, and plotting them against the time of cycle in days, the following results were achieved:

TABLE 14.—INCIDENCE OF PSYCHOTIC-BEHAVIOUR DISTURBANCE RELATED TO TIME OF MENSTRUAL CYCLE

Time of cycle	Number of disturbances	% of total number of disturbances
1st–10th day	54	28
11th–20th day	60	32
21st–30th day	75	40

It will be seen that there is a significant increase in the total number of disturbances recorded during the last 10 days as opposed to the first 10 days of the cycle ($T = 2{\cdot}5$). There is no significant difference between total number of disturbances occurring during the first 10 days as opposed to the tenth to twentieth day, nor between eleventh to twentieth and twenty-first to thirtieth day.

A frequency distribution curve in which percentage of total number of disturbances is plotted against the time of cycle in days is shown in Fig. 2.

Psychotic disturbance related to amenorrhoea and prolongation of the cycle. In addition to determining the relationship between psychotic behaviour and the various phases of the menstrual cycle, it is proposed to demonstrate any existing relationship between the occurrence of amenorrhoea and prolongation of cycle, and the time of cycle at which the psychotic behaviour disturbance takes place. For this purpose a further group of 19 psychotics was studied. All had a record of frequent outbursts of violence and resistive behaviour. In the first place, the total number of psychotic disturbances occurring over a period of time was noted and a record was taken of the time at which these occurred,

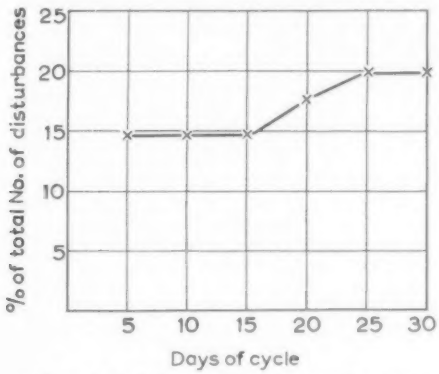

FIG. 2.—Incidence of psychotic behaviour disturbance related to time of menstrual cycle.

in relationship to the menses. Behaviour disturbances during a period of amenorrhoea or prolonged cycle were not included in this series. Amenorrhoea or prolongation of cycle followed some of these behaviour disturbances immediately, and in other instances only after an intervening menstruation had occurred. In 42·7% of occurrences of disturbed behaviour, either immediate or delayed (i.e. following an intervening menstruation), amenorrhoea or prolongation of cycle occurred. The ratio of immediate to delayed disturbance was 66% immediate to 34% delayed. The ratio of immediate to delayed menstrual disturbance following psychotic behaviour during the first to tenth day of cycle was 3·4 : 1, while for the eleventh to thirtieth day it was only 1·2 : 1.

It was first determined that no individual patient was contributing an unusually high number of incidences of immediate menstrual disturbance to any one of the three subdivisions of the cycle. The incidence of immediate amenorrhoea and prolongation of cycle was then calculated by combining all the behaviour disturbances together and treating the whole group as an individual. The results obtained are shown in Table 15 below:

TABLE 15.—INCIDENCE OF IMMEDIATE MENSTRUAL DISTURBANCE RELATED TO TIME OF CYCLE AT WHICH PSYCHOTIC BEHAVIOUR DISTURBANCE OCCURRED

Day of cycle	Total number of disturbances	Incidences of immediate amenorrhoea and prolonged cycle
0–10	107	41
11–20	95	20
21–30	67	14

A chi-square test was carried out on these results and showed the difference between the observed results and those that might have been expected to arise by chance, to reach a fairly high degree of significance (0·01 level). The result was due to an unusually high proportion of occurrences of

immediate menstrual disturbance, following psychotic behaviour disturbance, occurring during the first to tenth day after the onset of menstruation.

Conclusions. Disturbed behaviour occurs in psychotics only slightly more often during periods of regular cycles than during periods of amenorrhoea. The psychotic behaviour disturbance which occurs during a time of normal cycle is significantly more frequent during the last half of, and in particular the last 10 days of, the cycle. The reason for this increased incidence during the pre-menstrual phase of the cycle may lie in the occurrence of pre-menstrual tension symptoms which are later shown to occur in a fairly high proportion of psychotics. Severe tension is unusual in psychotics, but if the severity of the symptoms be admitted to depend on the patient's consciousness of and sensitivity to physiological processes taking place within her, it may well be that the psychotic, while failing to be fully aware of the disturbance, reacts to it in the form of increasingly disturbed behaviour.

Prolongation of cycle and amenorrhoea is a very common event following the development of acute psychotic disturbance. It occurred in 42% of the instances observed. There is no special tendency for the disruption of the cycle to be more or less frequent in relationship to the time of cycle at which the disturbed behaviour occurs. Disturbances at different times throughout the cycle gave rise to an approximately equal proportion of instances of menstrual disruption. However, if account is taken of whether the menstrual disturbance occurs immediately before or after an intervening cycle, it is found that a significantly higher proportion of immediate disturbances occur when the psychotic behaviour is located during the first to tenth day of the cycle. Evidently it is possible in instances of delayed disturbance that, although the physiological effect of the disturbance has occurred, menstruation is able to proceed independently of it, but subsequently a fresh cycle fails to be initiated. This is suggestive of the effect being to cause a hypothalamic type of amenorrhoea, which only becomes apparent immediately if ovulation has not yet taken place. If ovulation has occurred, presumably menstruation may still take place prior to the onset of menstrual disruption. If the effect were to cause local abnormality in the endometrium, i.e. the decreased vascular responsiveness of SOSKIN *et al.* (1940) by decreasing the acetylcholine content as a result of autonomic disturbance, it would seem more likely that immediate, rather than delayed, disturbance would occur in all instances.

3. SUBJECTIVE SYNDROMES OF MENSTRUAL DISTURBANCE

Dysmenorrhoea and Pre-menstrual Tension Contrasted in a Neurotic and a Psychotic Group

It was decided to compare the more subjective types of menstrual disturbance in a psychotic and a neurotic group. In addition to comparing the incidence and severity of symptoms, the significance of previous obstetric and gynaecological history was taken into account. All the neurotics were patients undergoing treatment in the Neurosis Unit at Claybury Hospital. The psychotics were all patients in whom a diagnosis of schizophrenic or paranoid psychosis had been made. They do not form a truly representative psychotic group, in that it was necessary to select those psychotics who were sufficiently well preserved in personality to give an account of their symptoms. However, their relative accessibility would be a factor working in favour of an increased tendency to reveal symptoms rather more readily, and thus any diminution

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in the incidence of menstrual abnormality would be of added significance, and this is proved to be the main trend revealed.

The following relationships were studied:

(1) Incidence of previous gynaecological procedures.
(2) Incidence of pre-menstrual symptoms.
(3) Incidence of dysmenorrhoea.
(4) Relationship between pre-menstrual symptoms and dysmenorrhoea.
(5) Relationship between pre-menstrual symptoms and other psychiatric symptoms.
(6) Relationship between pre-menstrual symptoms and menstrual cycle.
(7) Previous obstetric history.

Incidence of previous gynaecological procedures. A history was taken of any previous gynaecological treatment, whether surgical or medical. Obstetric procedures were not included, except in cases of termination of pregnancy and sterilization, where the mental state of the patient had been the reason for these procedures.

Twenty-seven of the patients had previously undergone gynaecological treatment at some time or other before their present admission to hospital. Twenty-five of the 27 were in the neurotic group. The incidence of previous procedures per patient was as follows:

TABLE 16

	Number of patients	Incidence of previous gynaecological procedures	% Incidence
Neurotics	52	25	48
Psychotics	46	2	4

The 25 neurotics who had previously had some form of gynaecological treatment had in all undergone eleven different types of procedure on forty-eight separate occasions. The type of treatment they had undergone is listed below in Table 17:

TABLE 17.—INCIDENCE OF PREVIOUS GYNAECOLOGICAL PROCEDURES

	Number of occasions
Cauterisation of cervix	10
Dilatation and curettage	8
Ovarian cystectomy	6
Ring pessary	6
Termination of pregnancy and sterilization	4
Operation for prolapse	3
Hormone treatment for dysmenorrhoea	3
Hormone treatment for lack of libido	2
Removal of cervical polypus	2
Treatment for vaginal discharge	2
Hormone treatment for oligomenorrhoea	1
Hysterectomy for fibroids	1

Conclusions. It is evident that a previous history of some form of gynaecological procedure is exceedingly common in neurotics, but only an occasional occurrence in psychotics. The possible psychosomatic basis of disorders of menstruation has been discussed previously. It remains a question of doubt to what extent psychic factors underlie many gynaecological conditions, and certainly no claim is made here that

all the conditions for which treatment was received were psychically determined. However, the incidence of 48% is so high that it requires some form of explanation. It would seem a reasonable assumption that one of the factors underlying this high incidence is a tendency for the neurotic to localize her symptoms in the region of the pelvis, partly perhaps via psychosomatic pathways, i.e. congestion fibrosis syndrome (TAYLOR, 1949), and partly because one of her main problems being a difficulty in assumption of the feminine role, she seeks any form of treatment which is directed towards her pelvic organs.

For some reason the psychotic does not show this tendency. The possible factors underlying this difference are:

1. In psychotics the same psychosomatic pathways are not utilized as in neurotics.
2. The psychotic does not seek desperately a remedy for her problems, but withdraws within herself and denies or projects the conflict.

Incidence of pre-menstrual tension. A history was taken from each patient of the incidence of any pre-menstrual symptoms. The severity of the symptoms was assessed as none, moderate, or severe. This was based entirely on the patient's subjective assessment of her own symptoms. The incidence of pre-menstrual symptoms in the two groups was as follows:

TABLE 18.—INCIDENCE OF PRE-MENSTRUAL TENSION IN NEUROTICS AND PSYCHOTICS

	Total number of patients	Incidence of symptoms	% Incidence
Neurotics	52	46	88
Psychotics	46	30	65

The significance of the difference between these two proportions was determined, and found to reach a level of statistical significance ($T = 2{\cdot}8$).

The severity of the symptoms experienced was found to be as follows:

TABLE 19.—DEGREE OF PRE-MENSTRUAL TENSION IN NEUROTICS AND PSYCHOTICS

Degree of pre-menstrual tension	Neurotics	Psychotics
None	8 (15%)	14 (32%)
Moderate	28 (55%)	24 (51%)
Severe	16 (30%)	8 (17%)

The types of symptoms experienced were variable. Depression was most common amongst the neurotic group. Feelings of anxiety and tension were about equally common in both groups. Psychotics showed considerably more variability in the type of symptom experienced.

Conclusions. Pre-menstrual tension occurs with significantly greater frequency in neurotics as opposed to psychotics. Mild tension occurs significantly more often than severe tension in psychotics ($T = 3{\cdot}7$) and to a lesser degree the same trend is shown in neurotics ($T = 2{\cdot}6$). The incidence of severe tension is higher in neurotics

than psychotics, but the difference was not sufficient to be statistically significant. It may represent a trend which could be demonstrated more adequately in a larger series.

These findings are probably partly related to the neurotic's undue sensitivity to any type of physiological change.

Incidence of dysmenorrhoea. A history was taken from each patient of the incidence of pain, either before or during the menses. The severity of the symptoms was assessed as severe, moderate, or none. As in the previous section, the assessment was made entirely according to the subjective description offered by each patient. The incidence of dysmenorrhoea in each group was as follows:

TABLE 20.—INCIDENCE OF DYSMENORRHOEA IN NEUROTICS AND PSYCHOTICS

	Total number of patients	Incidence of dysmenorrhoea	% Incidence
Neurotics	52	34	66
Psychotics	46	36	78

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The difference between these two proportions did not reach a level of statistical significance. The severity of the symptoms experienced was found to be as follows in Table 21:

TABLE 21.—SEVERITY OF DYSMENORRHOEA IN NEUROTICS AND PSYCHOTICS

Degree of severity of dysmenorrhoea	Neurotics	Psychotics
None	18 (34%)	10 (22%)
Moderate	15 (29%)	30 (65%)
Severe	19 (37%)	6 (13%)

Conclusions. The incidence of dysmenorrhoea is not significantly different in either psychotics or neurotics. In both groups there is a high incidence of pain at the time of the menses. Mild, as opposed to severe, dysmenorrhoea occurs significantly more often in psychotics ($T = 6{\cdot}1$). In neurotics the incidence of severe dysmenorrhoea does not differ significantly from that of mild dysmenorrhoea. Comparing psychotics with neurotics, the incidence of a mild degree of pain is significantly more frequent in the psychotic group ($T = 3$). Severe pain is significantly more frequent an occurrence in neurotics ($T = 2{\cdot}8$) than in psychotics.

The incidence of more severe cases amongst neurotics may be attributable to their greater sensitivity to pain, while the preponderance of mild cases amongst psychotics suggests a tendency on the part of the psychotic to minimize or even deny subjective symptoms. It is also possible that the low incidence of severe pain in psychotics is associated with an increased tendency to irregular cycles and anovular bleeding.

Relationship between pre-menstrual tension and dysmenorrhoea. The incidence in

severity of dysmenorrhoea was related to the incidence and severity of pre-menstrual tension symptoms. The results are shown in Table 22 below:

TABLE 22.—PRE-MENSTRUAL TENSION RELATED TO DYSMENORRHOEA

Degree of pre-menstrual tension	Number of patients	Incidence and severity of dysmenorrhoea		
		None	Mild	Severe
None	22	10	7	5
Mild	52	16	25	11
Severe	24	2	13	9

A chi-square test was carried out on these results in order to determine whether the observed incidences of dysmenorrhoea differed significantly from those that might have been expected, had there been no correlation between dysmenorrhoea and pre-menstrual tension whatsoever. The test only showed a low degree of correlation between dysmenorrhoea and pre-menstrual tension.

The difference contributing chiefly to the degree of significance shown by the test were those between expected and observed incidence in two groups:

(1) Absence of dysmenorrhoea in patients with absence of pre-menstrual tension.

(2) Absence of dysmenorrhoea in patients with severe pre-menstrual tension.

There was thus a low positive correlation between absence of pre-menstrual tension and absence of dysmenorrhoea. There was also a low negative correlation between severe pre-menstrual tension and absence of dysmenorrhoea.

The lack of much significant correlation between pre-menstrual tension symptoms and dysmenorrhoea would be explicable on the grounds that the latter is a syndrome associated with normal ovulatory cycles and therefore a reasonably normal hormonal balance, whereas the former is associated with a severe hormonal imbalance.

That there was some degree of positive correlation between absence of dysmenorrhoea and absence of pre-menstrual tension, would be explicable on the grounds that this may represent a group of patients who show either a low sensitivity to any type of physiological disturbance or else a common tendency to anovular menstruation. The negative correlation between presence of severe pre-menstrual tension and absence of dysmenorrhoea is understandable on the assumption that patients who are unduly sensitive to the one type of physiological disturbance will almost certainly show some degree of sensitivity to the other. Although two different types of abnormal physiology are believed to be involved in the causation of these two syndromes, there is evidence that they are not mutually exclusive. If the latter were to occur, a higher negative correlation would be expected.

Relationship between pre-menstrual symptoms and psychiatric symptoms. Each patient was asked to state whether she noticed a relationship between any psychiatric symptoms of which she was aware and the pre-menstrual phase of her cycle. It was established in each case that pre-menstrual tension alone was not being described, and that where a relationship was noted, it was concerning symptoms which were present at other times during the cycle and which became intensified at the time of the pre-menstrual phase. The only exception to this was one incident in which worsening of the pre-menstrual tension itself was associated with the onset of neurotic symptoms. In Table 23 below the incidence of this relationship is tabulated under two headings: either no or some relationship between psychiatric symptoms and the pre-menstrual phase.

The proportion of neurotics showing a relationship between their symptoms and the pre-menstrual phase of the cycle is significantly greater than the proportion of

TABLE 23.—PRE-MENSTRUAL TENSION RELATED TO PSYCHIATRIC SYMPTOMS

	Total number of patients	No relationship	Some relationship
Neurotics	52	35 (68%)	17 (32%)
Psychotics	46	41 (89%)	5 (11%)

psychotics showing this relationship ($T = 2{\cdot}6$). Of the patients showing some relationship between psychiatric symptoms and the pre-menstrual phase, 18 out of 22 suffered from a severe degree of pre-menstrual tension (81%). Conversely, 75% of patients with severe pre-menstrual tension noted a relationship between this and their psychiatric symptoms.

In both the neurotic and the psychotic group the majority of the patients were not aware of any relationship between their psychiatric symptoms and the pre-menstrual phase of the cycle. Where a relationship was felt to exist, it was noted, and the following results obtained:

Neurotics

(1) All phobias and anxiety symptoms worse . . . . . 8 cases
(2) Depressive symptoms worse . . . . . 6 cases
(3) Personality difficulties worse . . . . . 2 cases
(4) Pre-menstrual tension worse since onset of neurosis . . . 1 case

Psychotics

(1) Depression intensified . . . . . 5 cases

Conclusions. Although pre-menstrual tension has been shown to occur in a very high proportion of both neurotics and psychotics, it is not invariably related to the symptoms of neurosis or psychosis, at any rate to the extent of the patient's own awareness of such a relationship. In about one-third of neurotics there is a relationship noticed by the patient herself, and this usually takes the form of an intensification of any affectively determined symptoms. In a significantly smaller proportion of psychotics (1 in 10) a similar relationship is noted, and once more it is the affectively determined symptoms which are intensified. Where a relationship does exist, it is associated with a high incidence of severe tension (81%). Conversely, the majority of patients with severe pre-menstrual tension relate this to a worsening of their psychiatric symptoms (75%).

The majority of patients showing this relationship were neurotics. It may be that this is due to the neurotic's unusual sensitivity to physiological changes taking place within herself. If these changes are marked, all her neurotic fears are activated, and, conversely, if her neurosis is severe she will interpret even minor physiological changes as being of undue importance.

Relationship between pre-menstrual tension, dysmenorrhoea, and the menstrual cycle. The occurrence of both pre-menstrual symptoms and dysmenorrhoea was compared with the degree of regularity of the cycle. A history was taken from each patient of any previous irregularity of cycle, and the menses were noted during the stay in hospital. From these data it was decided in each case whether the cycle was predominantly regular or whether there was fairly frequent irregularity or periods of

amenorrhoea. The patients were then grouped into two main groups, those with a regular and those with an irregular cycle. The results are shown in Table 24 below:

TABLE 24.—PRE-MENSTRUAL TENSION AND DYSMENORRHOEA RELATED TO REGULARITY OF CYCLE

	Number of patients	Dysmenorrhoea			Pre-menstrual tension		
		Nil	Mild	Severe	Nil	Mild	Severe
Regular cycle	49	13	21	15	11	31	7
Irregular cycle	49	15	24	10	11	21	17

The differences between these proportions and those that might be expected to have occurred, had there been no relationship between either dysmenorrhoea or pre-menstrual tension and the regularity of the cycle, were only small. 70% of patients with severe pre-menstrual tension had a history of previously irregular cycles. 60% of patients with severe dysmenorrhoea had a history of previously regular cycles. At the most it can be said that both these proportions represent a low positive correlation between:

(1) Severe pre-menstrual tension and irregularity of cycle.

(2) Severe dysmenorrhoea and regularity of cycle.

This would be in accordance with what might be expected, for pre-menstrual tension being associated with hormonal imbalance, it may be argued that irregularity of cycle would not be an unexpected accompaniment. Similarly, since dysmenorrhoea has been associated predominantly with the presence of ovulatory cycles, and ovulation is a characteristic of the normal cycle, it would be an understandable occurrence that dysmenorrhoea and regular cycles would tend to correlate.

Previous obstetric history. A history was taken of previous pregnancies from each patient. The degree of parity of the two groups is shown in Table 25 below:

TABLE 25.—INCIDENCE OF PARITY AND NULLIPARITY IN NEUROTICS AND PSYCHOTICS

	Total number of patients	Nullips	Parous
Neurotics	52	16 (30%)	36 (70%)
Psychotics	46	31 (67%)	15 (33%)

It will be seen that there is a positive correlation between parity and neurosis, and between nulliparity and psychosis.

The relationship of parity to the incidence and severity of pre-menstrual tension is shown in Table 26 below:

TABLE 26.—PARITY RELATED TO PRE-MENSTRUAL TENSION

Degree of pre-menstrual tension	Nullips	Parous
Nil	12	10
Mild	26	26
Severe	9	15

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A chi-square test performed on these results showed no tendency to any significant difference between these proportions and those that might be expected, had parity no correlation with degree of premenstrual tension at all.

The relationship of parity to the incidence and severity of dysmenorrhoea is shown in Table 27 below:

TABLE 27.—PARITY RELATED TO DYSMENORRHOEA

Degree of dysmenorrhoea	Nullips	Parous
Nil	7	21
Mild	26	19
Severe	14	11

A chi-square test carried out on these results showed a significant difference between these proportions and those that might be expected to have arisen had there been no relationship between degree of dysmenorrhoea and parity. The differences were due to a positive correlation between absence of dysmenorrhoea and parity, and a negative correlation between absence of dysmenorrhoea and nulliparity. In the light of the well-known fact that dysmenorrhoea often improves following the birth of a child, these correlations would be understandable.

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4. MENSTRUAL DISTURBANCE FOLLOWING SHOCK TREATMENT

The effects of ECT, deep insulin, and leucotomy on the menstrual cycle

The effects of ECT, deep insulin, and leucotomy on the menstrual cycle was studied in 182 instances. ECT was given alone in 138 instances. The total incidence of menstrual disturbance was 52·8% of instances. 61% of all menstrual disturbances were immediate, while 39% were delayed.

The incidence of immediate and delayed menstrual disturbance was noted in relationship to the time of cycle at which ECT had commenced. The results are shown in Table 28 below:

TABLE 28.—INCIDENCE OF MENSTRUAL DISTURBANCE FOLLOWING ECT

Time of cycle	Total number of instances	Immediate prolonged cycle or amenorrhoea	Delayed prolonged cycle or amenorrhoea	No disturbance
1st–10th day	58	25	7	26
11th–20th day	46	9	13	24
21st–30th day	34	11	8	15

Assuming that there was no relationship between time of cycle at which ECT commenced and the immediate or delayed nature of the menstrual disturbance, and knowing that 61% of all the disturbances were immediate and 39% were delayed, the results which might have been expected to occur according to this hypothesis can be calculated.

A chi-square test was performed on these results in order to demonstrate whether there were significant differences between the observed number of instances of immediate amenorrhoea and prolongation of cycle and the expected number, had there been no relationship between time of cycle at which ECT commenced and the subsequent menstrual disturbance. It showed that there was a significantly higher proportion of occurrences of immediate menstrual disturbance and a significantly lower proportion of occurrences of delayed disturbance when treatment commenced between the first and tenth day of the cycle (0·05 level). For treatments commencing between tenth and twentieth day and twenty-first and thirtieth day there was no significant difference between the observed and expected number of incidences of menstrual disturbance.

A frequency distribution curve was made (Fig. 3) showing the length of time between cessation of treatment and resumption of menses plotted against the number of separate instances, This shows a small peak in the region of 6–10 days and another in the region of 21–25 days. The differences were not of sufficient magnitude to reach a level of significance, but the result was suggestive of similar findings to those obtained by MICHAEL (1954).

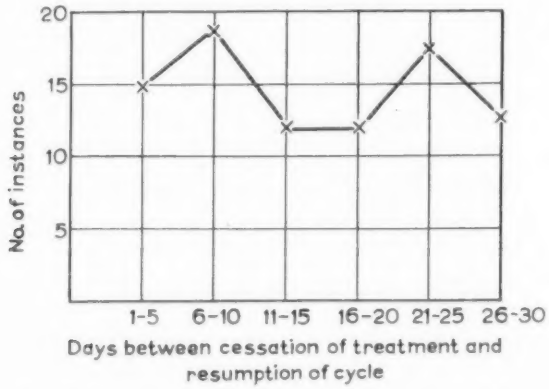

FIG. 3.—Frequency distribution curve showing time between cessation of treatment and resumption of menses.

The incidence of menstrual disturbance was related to the age of the patient. Of 34 patients in the age group 15–25 years, 5 became amenorrhoeic (14%). Of 40 patients in the age group 26–35 years, 10 became amenorrhoeic (25%). Of 17 patients in the age group 36–45 years, 6 became amenorrhoeic (35%). The difference between these proportions did not reach a level of statistical significance, but the appearances are of a trend towards increased incidence of amenorrhoea in the older age groups.

Variability of response to ECT. The variability of response was studied in 46 patients who underwent shock therapy on more than one occasion. They underwent 119 separate courses of treatment in all. 27 showed a variable response to treatment (i.e. both disturbance of cycle and absence of disturbance of cycle) on different treatment occasions, while 19 showed a uniform response (i.e. always had a menstrual disturbance or always had an absense of menstrual disturbance). 35 patients showed menstrual disturbance when first subjected to ECT. In 32 out of 56 subsequent instances of treatment (57%) this group again showed menstrual disturbance. 11 patients showed no menstrual disturbance when first subjected to ECT. In 6 out of 17 subsequent instances of treatment (35%), this group showed an absence of menstrual disturbance.

It will be seen that the group of patients who failed to show any form of menstrual disturbance when first subjected to treatment subsequently had a higher rate of amenorrhoea and prolongation of cycle than the group whose reaction to their first treatment was a disruption of the menstrual cycle.

It is concluded that there is no special tendency for a patient who responds to shock therapy, with or without menstrual disturbance, to continue to respond in a similar way on subsequent treatment occasions.

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Comparison of ECT effects with psychotic disturbance effects. The total incidence of menstrual disturbance following ECT was 52·8% of cases, while that following psychotic behaviour disturbance was 42·7% of cases. 61% of all menstrual disturbance following ECT was immediate, while 39% was delayed. 66% of menstrual disturbance following psychotic behaviour was immediate, while 34% was delayed. The ratio of immediate to delayed menstrual disturbance was 3·5 : 1 in cases of ECT commencing during the first to tenth day of the cycle, and 3·4 : 1 following psychotic behaviour disturbance occurring during the first 10 days of the cycle. When ECT commenced during the last 20 days of the cycle, this ratio dropped to 0·9 : 1, and similarly, when psychotic behaviour disturbance occurred during the last 20 days of the cycle, the ratio dropped to 1·2 : 1.

Deep insulin coma therapy. Deep insulin coma therapy was administered to 58 patients. Amenorrhoea or abnormal prolongation of the cycle occurred in 39 patients. In 8 instances either the previous use of ECT or previously established amenorrhoea complicated the results. In 3 patients early discharge from hospital precluded an adequate study being made.

In the remaining 47 patients, prolongation of the cycle or amenorrhoea occurred in 39 (83%), whilst menstruation was undisturbed in 7 (17%). The disturbance of menstruation consisted of 21 cases of prolongation of the cycle (45%) and 18 cases of amenorrhoea (38%).

The relationship of amenorrhoea to duration of treatment was studied. In 10 patients the disturbance of menstruation occurred immediately following the onset of treatment without any intervening menstruation. In 14 patients the disturbance occurred after one intervening menstruation. In 11 patients there were two cycles prior to the disturbance and in 4 patients amenorrhoea occurred after an interval of 3 cycles.

It is concluded that menstruation is disturbed to a high degree during deep insulin therapy, 83% of patients showing prolonged cycle or amenorrhoea. In 61% of these the disturbance occurs immediately or after only one intervening cycle.

Leucotomy. A high proportion of the patients who underwent the operation of bilateral prefrontal leucotomy were not suitable for inclusion in this series because they were amenorrhoeic at the time of operation. In 15 cases the incidence of amenorrhoea or prolongation of cycle was 73% (11). Of these, 8 had immediate disturbance of cycle and 3 delayed disturbance. The figures were not of sufficient magnitude to merit statistical treatment.

Conclusions. The findings of previous observers are largely confirmed. The interruption of menstruation during the course of treatment is the characteristic effect, and occurs in a varying proportion of patients treated according to the criteria used for deciding that a disturbance has occurred. The disturbance may be immediate or delayed, and varies from prolongation of cycle to actual amenorrhoea. Short cycles also occur.

The incidence of immediate menstrual disturbance is significantly higher in cases where treatment commenced between the first and tenth day of the cycle. It is postulated that this suggests that the effect is related to a hypothalamic type of amenorrhoea. Delayed disturbance is related to the time of ovulation, for, when the stage of ovulation has been reached prior to the commencement of treatment, the endometrium may be sufficiently developed for an initial menstruation to occur before

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the menstrual disruption becomes apparent. The same phenomenon has been shown in the increased proportion of immediate to delayed menstrual disturbances following disturbed psychotic behaviour during the first 10 days of the cycle. It is suggestive of a similar pathway mediating the effects of both ECT and psychotic disturbance. Presumably both cause a hypothalamic type of amenorrhoea.

SUMMARY

(1) Mean length of cycle, variability of cycle expressed as standard deviation from the mean and incidence of amenorrhoea, were studied in a group of 219 psychiatric patients under treatment at Claybury Hospital between 1948 and 1953.

The mean length of cycle is significantly increased in all psychiatric patients, except psychoneurotics, who do not differ markedly from normals.

Variability of cycle is increased in all types of psychiatric patient, including psychoneurotics, but the latter show significantly less variability than psychotics and in particular schizophrenics.

There is no relationship between either mean length of cycle or variability of cycle and the length of stay in hospital. Amenorrhoea occurs with great frequency in psychotics, and in particular schizophrenics. The incidence in psychoneurotics and patients with affective types of reaction is not significantly greater than in normals. The incidence of amenorrhoea in psychotics remains roughly similar throughout the patient's stay in hospital, but during later years a slight rise in incidence occurs. This may be related to neuro-endocrine instability at the time of the menopause.

There is no significant relationship between age and amenorrhoea, but suggestions of a trend towards increased incidence in the age groups 16–20 years and 36–46 years. This also would be explicable in the light of an increased neuro-endocrine instability at the onset, and shortly before the cessation of the menstrual epoch.

(2) The relationship of amenorrhoea and prolongation of the cycle to the mode of onset and course of the psychosis was studied in a group of 58 psychotics followed up over a period of 2 years. The significance of prognosis and weight in relationship to menstrual disturbance was also studied.

The mode of onset of a psychosis determines whether there is a high rate of menstrual disturbance. Catatonic stupor in particular is associated with amenorrhoea. Over-active and disturbed onsets are also associated with a trend towards increased incidence of menstrual disruption. Patients whose menses are abnormal at the onset tend to maintain a higher rate of disturbance for a time, but after 2 years in hospital this relationship ceases to exist.

Absence of menstrual disturbance at the onset of the illness is associated with a slightly better prognosis, but the existence of amenorrhoea during the 3 months before discharge is of bad prognostic import and is associated with a high rate of relapse.

There is no relationship between weight level and amenorrhoea, apart from a tendency for patients who are amenorrhoeic to show a greater variability in their weights than those who are regular. Weight may be gained or lost during a period of amenorrhoea, and in many instances fluctuates, but this fluctuation is not any greater than that which occurs during periods of regular cycle.

(3) Twenty-two disturbed psychotics were studied over a period of 2 years. A relationship was shown to exist between the time of cycle at which their behaviour

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disturbance occurred and the frequency of this type of disturbed behaviour. A significantly higher proportion of behaviour disturbances were found to occur during the last 10 days of the cycle, and a correspondingly lower proportion during the first 10 days of the cycle. The reason for this increased incidence during the pre-menstrual phase of the cycle is probably related to the occurrence of pre-menstrual tension symptoms which have been shown to occur in a fairly high proportion of psychotics.

Nineteen disturbed psychotics were also studied over a period of 2 years in order to determine any relationship between the incidence of amenorrhoea and prolongation of cycle and the time of cycle at which the disturbed behaviour occurred.

It was found that the incidence of amenorrhoea and prolongation of cycle did not vary according to the time of cycle at which any preceding psychotic behaviour disturbance occurred, unless note was taken of the immediate or delayed nature of the menstrual abnormality.

A significantly higher proportion of immediate as opposed to delayed (i.e. following an intervening cycle) menstrual disturbances occurred when the psychotic behaviour took place during the first to tenth day of cycle.

It is postulated that this relationship is indicative of the fact that psychotic behaviour disturbance is associated with a hypothalamic type of amenorrhoea which only becomes apparent immediately if ovulation has not yet taken place. In patients who have ovulated, an intervening menstruation occurs before the disturbance of cycle becomes apparent.

(4) The more subjective syndromes of menstrual disturbance were studied in a group of 52 neurotics and a group of 46 psychotics. Previous obstetric and gynaecological history was also taken into account.

(a) A very high incidence of previous gynaecological procedures was found in the neurotic group.

(b) Pre-menstrual tension was shown to occur in a high proportion of both neurotics and psychotics. The incidence was significantly greater in neurotics. Mild tension was most common amongst psychotics, while severe tension was more common amongst neurotics.

Pre-menstrual symptoms were not usually related to the other psychiatric symptoms but where such a relationship existed it was generally in neurotics and in instances where the pre-menstrual symptoms were severe.

(c) Dysmenorrhoea was shown to occur in a high proportion of both neurotics and psychotics. A mild type of dysmenorrhoea was common in psychotics, while the severe variety was more frequently found in neurotics.

(d) Dysmenorrhoea and pre-menstrual tension were shown to have a very low degree of correlation. This was felt to be in keeping with the fact that both result from very different types of physiological disturbance, one being associated with the presence of ovular cycles and a reasonably normal hormonal balance, while the other is associated with a hormonal imbalance.

(e) Pre-menstrual tension of the severe variety showed a low degree of correlation with irregularity of cycle. The correlation may be determined by the presence of a severe hormonal imbalance.

Dsymenorrhoea of the severe variety showed a low degree of correlation with regularity of cycle. The correlation may be determined by the presence of ovulatory cycles, and therefore a reasonably normal hormonal balance.

(5) The effects of ECT deep insulin, and leucotomy on the menstrual cycle were studied in 182 patients. The findings of previous observers were confirmed and a high incidence of amenorrhoea and prolongation of cycle found to occur. The time of cycle at which shock treatment commences determines whether the subsequent menstrual disturbance is immediate or delayed following an initial cycle. A significantly higher proportion of cases of immediate menstrual disturbance occurs when treatment commences during the first to tenth day of cycle. It is postulated that this is a similar effect to that already demonstrated in patients who have become amenorrhoeic following acute psychotic behaviour disturbance, and that it indicates a hypothalamic type of amenorrhoea.

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OBSERVATIONS ON THYROID ADRENOCORTICAL RELATIONSHIPS

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IN THE course of serial studies of endocrine function in psychiatric patients, spontaneous fluctuations of one or both of the indices of thyroid and adrenocortical activity were observed on a number of occasions. The findings during these periods have been collected in order to present evidence of the interaction of these glands in the absence of pharmacological interference. The fluctuations in adrenocortical activity described are the subject of continuing enquiry, and their possible clinical significance will not be considered at this time.

MATERIAL AND METHODS

Types of patients

Observations have been made on six patients suffering from psychiatric disorder. In three of these the major psychiatric diagnosis was depression, whilst the remaining three comprised one obsessional, one paranoid schizophrenic, and one psychopathic personality. The findings were recorded whilst the patients were under detailed psychiatric observation in the same ward, where environmental temperature fluctuations did not occur. All patients took a full diet, and in no instance did any major variation in intake occur.

Also included are observations on six patients with thyrotoxicosis. These patients (or in some instances the relevant specimens from them) were referred from general hospitals for the purposes of this investigation and not for psychiatric reasons.

Methods

Urine was collected as 24-hr samples during the course of observation of these patients, varying from once weekly to daily collections. In some instances (including all those at weekly intervals) estimations were carried out on pooled 48-hr samples. Where this was done the mean 24-hr figure is given in the graphs.

Venous blood was collected at approximately weekly intervals for estimation of the serum protein bound iodine (PBI).

The total neutral 17-ketosteroids (17-Ks) were estimated by the M.R.C. recommended method (M.R.C. Committee on Clinical Endocrinology, 1951), modified only by the use of chloroform instead of carbon tetrachloride during the extraction, which has been found not to result in any significant difference. The s.d. of differences in a series of thirty-four urines each estimated on two separate occasions was 0·68 mg per 24 hr.

The acid stable formaldehydogenic substances (ASFS) were estimated by the method of TOMPSETT (1953, 1954), originally described as for corticosterone-like substances. This method is considered to estimate approximately 50 per cent of corticoid metabolites, and to give information of similar significance to that obtained from other measures of corticold metabolites such as the Norymberski 17-ketogenic steroids (NORYMBERSKI *et al.*, 1953). The use of this method is to be fully discussed in a separate communication (WILLCOX, in preparation). The normal range in this laboratory is 3·4–10·9 mg per 24 hr. The s.d. of the differences in a series of twenty-six urines each estimated on two separate occasions was 0·77 mg per 24 hr.

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The serum protein-bound iodine was estimated by a method slightly modified from GROSSMAN and GROSSMAN (1955). Normal range 3·3 μg per 100 ml serum to 7·4 μg per 100 ml serum. The s.d. of the differences in a series of 44 sera each estimated on two separate occasions was 0·44 μg per 100 ml.

The radio-iodine test of thyroid function used throughout, with the exception of one thyrotoxic patient in whom the 24-hr uptake of ^{131}I was carried out, was that described by POCHIN (1950). This is a modification of the 2-hr thigh-neck clearance described by FOOTE and MACLAGGAN (1951), and has been shown to have a correlation of +0·85 with clearance. The upper limit of the normal range is considered to be 10. The geometrical arrangement of the counters is such that the patient can be accurately repositioned for counting on a separate occasion.

RESULTS

Case 1. A 40 year old single woman was admitted because of a severe obsessional illness characterized by fears of contamination by plants, toilet rituals, counting compulsion, compulsive writing, a compulsive urge to behave like a dog, and a fear of going out. Her obsessional symptoms were only partially relieved by admission to hospital, and throughout the period of investigations she showed fluctuations in mood characterized mainly by marked irritability.

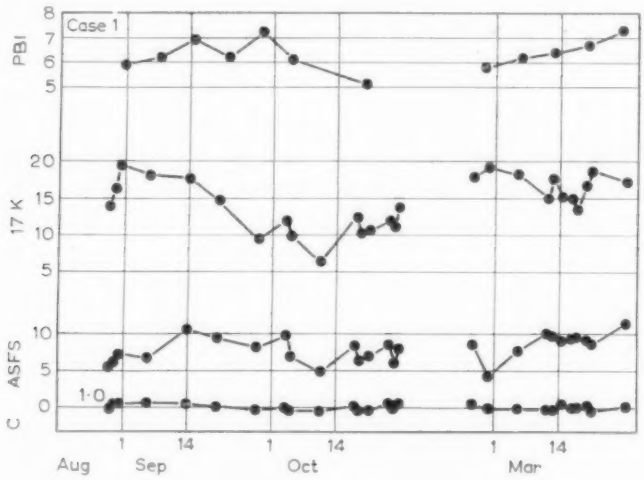

FIG. 1.

It will be seen from Fig. 1, which covers a period of rise and fall in the PBI, that the urinary excretion of 17-Ks. falls steadily during the rise and early part of the fall in PBI, then rising again, although the PBI continues to fall. The ASFS rises during the first 17 days, during which time the increase in PBI is just significant. Thereafter the ASFS excretion behaves similarly to the 17-Ks. excretion.

The second period covers a further month's observations when the PBI rose steadily. On this occasion the 17-Ks. showed a downward trend followed by a rise to approximately the previous level, whereas the ASFS shows a tendency to rise steadily throughout the period in parallel with the PBI.

Case 2. A 23 year old single man was admitted because of acute confusion and the delusion of death. He was very self-reproachful and believed that he had made mistakes that had resulted in the death of others. He received a course of ECT, which resulted in his being discharged symptom-free. During his illness there were brief periods when the patient was elated. Serial biochemical studies were carried out throughout his stay in hospital. These showed (Fig. 2) two peaks of 17-Ks. and of ASFS excretion, but during the entire period the serum PBI did not fluctuate significantly, and there was no definite general trend in these indices. However, the radio-iodine uptake, serum cholesterol, and the basal metabolic rate (BMR) all showed a slight but steady upward trend.

Case 3. A 54 year old married man was admitted because of a severe agitated depression with delusions of guilt and self-reproach. This illness began 1 year previously when the patient was suffering

from a subacute bacterial endocarditis, complicated by a cerebral embolism when transient neurological signs. He had no neurological signs on admission, and was given a course of ECT which resulted in only transitory improvement. It was during the whole period that the observations recorded here were made. These show (Fig. 3) a similar fluctuation in 17-Ks. to that seen in Fig. 2. The trend in ASFS excretion is similar, although less marked. Again the level of the serum PBI remains unchanged. Radio-iodine uptake measurements were not feasible because of the marked degree of agitation shown by this patient.

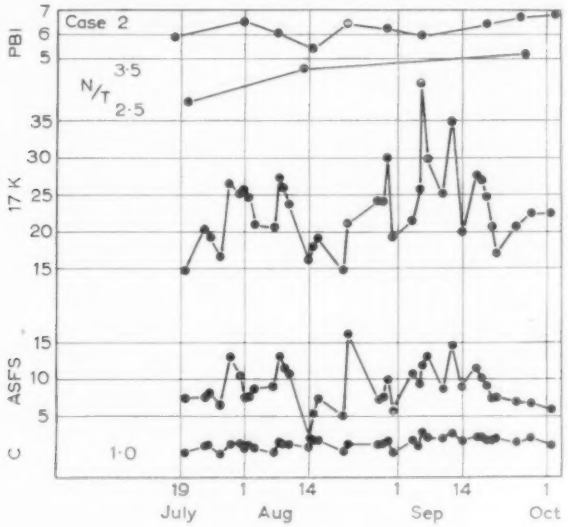

FIG. 2.

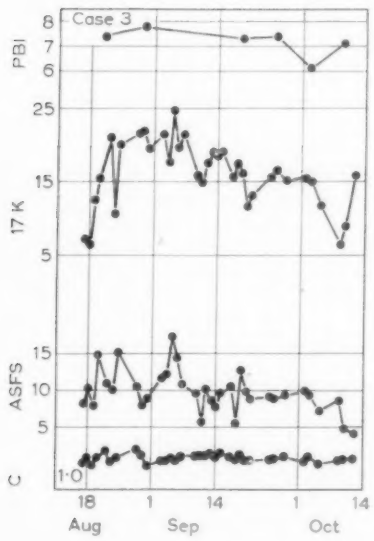

FIG. 3.

Case 4. A 47 year old married man was admitted with a history of 10 days' increasing depression. He responded to conservative measures and was discharged recovered after 2 months stay in hospital.

Serial investigations are illustrated in Fig. 4. Although there is considerable rise and fall of both steroid fractions measured, this patient did not exhibit any fluctuations in the levels of serum PBI throughout the same period.

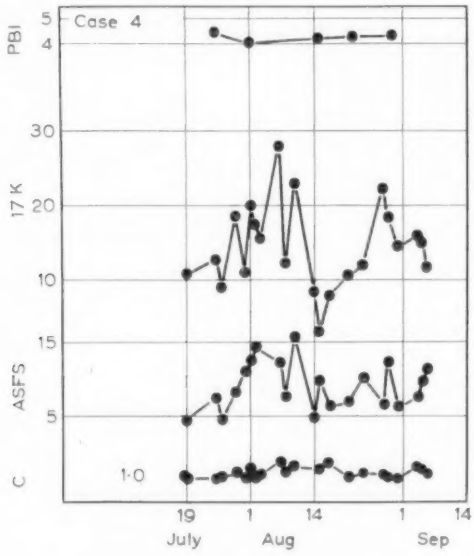

Fig. 4.

Case 5. This patient, a 23 year old married man, differs from the other patients, since his thyroid function was abnormal. He had had a subtotal thyroidectomy 1 year previously because of unmistakable signs of exophthalmic goitre. This patient was admitted following a suicidal attempt. He showed obsessional fears and marked irritability which had been present for 11 months. His thyroid state was found to fluctuate in terms of BMR, PBI, and radio-iodine uptake (Fig. 5). The majority of the values for the serum PBI are high or increased. There is, however, a sharp fluctuation when for a short period the PBI levels fell to the midnormal range. This trough coincides with a trough in the excretion of 17-Ks., whereas the level of ASFS excretion had fallen somewhat earlier. Following the return of the PBI to high levels, there is a considerable increase in the excretion of both steroid fractions, which is maintained for 8 days.

Case 6. A 48 year old married man was admitted to hospital for investigation because of the episodic nature of his schizophrenic illness. On admission, he was evasive, showed a variable mood, and became extremely paranoid in his attitudes after 2 weeks in hospital. He had been treated with thyroid extract gr. 6 daily for 9 months. This medication was withdrawn 2 days after admission, and serial investigations were begun (Fig. 6). Within 20 days of withdrawal of thyroid, the initial high level of serum PBI, presumably due to exogenous thyroid administration, fell to a subnormal level, and then rose again to normal levels during the following 20 days. Both steroid fractions were falling during the first observations, and subsequently the 17-Ks. showed a slow steady rise, while the ASFS remained at the same level.

Table 1 shows the findings in six patients suffering from thyrotoxicosis, the diagnosis being firmly established on both clinical and laboratory grounds. Estimations were made on four separate collections from case 1, and on two separate collections from case 3. In five of these patients, including the two with observations made on more than one occasion, the values for both 17-Ks. and ASFS were high in the normal range or slightly increased.

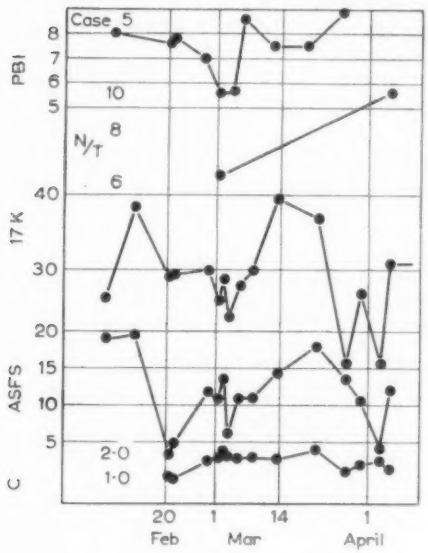

FIG. 5.

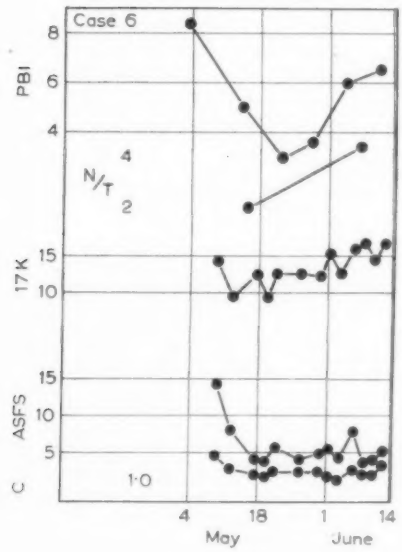

FIG. 6.

DISCUSSION

Reports of the interaction of the thyroid gland and the adrenal cortex in man present a confused picture. SOLIS-COHEN (1897) described a protective action of crude adrenal extract against thyroid intoxication. MARINE (1930) discussed the relation between these glands in Graves disease, suggesting that some degree of

TABLE 1.—EXCRETION OF URINARY STEROIDS IN CASES OF PROVED THYROTOXICOSIS

No.	Age	Sex	17 Ks. mg/24 hr	ASFS mg/24 hr	NORYMBERSKI 17 Ks. mg/24 hr	17 Ks. mg/24 hr	PBI μg/1000 ml	Radio I test
7a	52	M	16·8	13·1				
b			16·2	13·1				
c			19·8	15·2				
d			17·6	15·6				
8	33	M	19·0	12·6			9·4	
9a	51	F	13·4	8·9			12·3	71 (*N*/*T* ratio)
b			12·0	8·6				
10*	35	F	5·5	4·9	5·9	7·5		
11	36	F	10·0	9·0	9·8	13·2		80 (*N*/*T* ratio)
12	21	F	24·0	9·3	22·5	23·0		†76 per cent

* This patient was still thyrotoxic clinically at the time of investigation, but had received 3 months treatment with antithyroid drugs.

† 24-hr uptake after oral dose of ^{131}I—Normal 35 per cent.

hypoadrenocorticism existed in that condition. The excretion of urinary steroids in thyrotoxicosis has been reported as diminished (DAUGHADAY *et al.*, 1948: formaldehydogenic steroids), as increased (SHADAKSHARAPPA *et al.*, 1951: phosphomolybdate reducing substances), and as normal (LEVIN and DAUGHADAY, 1955: 17-ketosteroids and 17-hydroxycorticosteroids). The response to corticotrophin (ACTH) is normal (HILL *et al.*, 1950) in thyrotoxicosis.

Thyrotrophin (TSH) is said to reduce the excretion of formaldehydogenic steroids (GABRILOVE and SOFFER, 1955), but thyroxine causes an increase in adrenocortical activity (CORVILAIN, 1953).

Surgical stress may cause an increase in the level of the serum protein-bound iodine (SHIPLEY and MACINTYRE, 1954) or have no effect on this index (ENGSTROM and MARKARDT, 1955).

Large pharmacological doses of ACTH or cortisone (100–500 mg/day) appear regularly to depress thyroid activity within the gland (radio-iodine studies by FREDERICKSON *et al.*, 1952; HILL *et al.*, 1950; BERSON and YALOW, 1952; KUHL and ZIFF, 1952; ZINGG and PERRY, 1953), and sometimes to lower the serum protein-bound iodine slightly (FREDERICKSON *et al.*, 1951; HILL *et al.*, 1950), but there may be no effect on the level of circulating hormone nor on the tissues (BERSON and YALOW, 1952; KUHL and ZIFF, 1952).

On the other hand, cortisone and ACTH may increase thyroid activity in Addison's disease, and provoke temporary acute exacerbations in Graves disease (HILL *et al.*, 1950).

BONATI *et al.* (1955) have studied the effects of the administration of single shocks of electro-convulsive therapy (ECT) on the serum protein-bound iodine and

cholesterol, blood having been drawn before and 12 hr after the procedure. They were unable to demonstrate any changes in the serum levels.

There is a single report of the lowering of serum protein-bound iodine levels in relation to stressful interviews (HETZEL *et al.*, 1952) but the majority of reports are concerned with major pharmacological effects or with severe surgical stress.

In the experimental animal many authors have reported a reduction in the ^{131}I uptake of the thyroid gland as the result of various physical stresses; namely, trauma, fasting, cold and heat (WILLIAMS, JAFFE and KEMP, 1949), anoxia, starvation, and nephrectomy (VAN MIDDLESWORTH and BERRY, 1951), and tourniquet shock (HAMOLSKY, GIERLACH and JENSEN, 1951). BROWN-GRANT, HARRIS and REICHLIN (1954) have shown that haemorrhage, surgical operations, and the injection of turpentine all result in an inhibition in the rate of release of ^{131}I-labelled hormone from the thyroid gland of the rabbit. In the same paper these authors showed that stimuli designed to produce emotional stress (subcutaneous faradism, restraint, and abrupt changes in environmental lighting) all induced a prompt inhibition of 1–2 days duration in the release of thyroid hormone from the gland. They found that neither adrenalectomy nor stellate ganglionectomy abolished these responses and concluded that they were the result of a reduction in the secretion of TSH from the anterior pituitary gland.

PASCHKIS *et al.* (1950) showed a diminished ^{131}I uptake in rats as a result of the intramuscular injection of 10 per cent formalin, but both desoxycorticosterone and an aqueous adrenocortical extract had no effect. VAN MIDDLESWORTH and BERRY (1951) found that massive doses of cortisone did reduce the ^{131}I uptake, but not to the same degree as did anoxia. COLFER, DE GROOT and HARRIS (1950) found evidence of an increased discharge of ACTH as a result of emotional stress in the rabbit, and BROWN-GRANT, HARRIS and REICHLIN (1954) have shown that both cortisone and ACTH depress the rate of release of thyroid hormone from the rabbit's thyroid.

The dosage of cortisone needed to produce this effect in man is large (100–500 mg). The fact that changes in the blood and urinary levels of 17-Hydroxycorticosteroids due to stresses are of nothing like the order of those produced by intravenously administered ACTH (BLISS *et al.*, 1956) suggests strongly that in the absence of exogenous administration of large doses of either cortisone or ACTH, adrenal cortical activity does not reach a level at which TSH suppression might occur. Even in the case of serious illness and surgical stress of considerable magnitude, ENGSTROM and MARKARDT (1955) found that it was only when the illness was terminal that the PBI levels in the peripheral blood fell significantly, and could be correlated closely with the plasma protein levels. They produced evidence that exogenous cortisone did not alter the PBI levels by giving it to two patients with myxoedema maintained on constant amounts of desiccated thyroid and showing that the PBI was unaffected over a 2–3-day period. They were thus unable to confirm the finding of BONDY and HAGEWOOD (1952) in rats, that cortisone did in fact inhibit the utilization of thyroid hormone. SHIPLEY and MACINTYRE (1954) demonstrated in only three out of nine patients an increase in ^{131}I-labelled thyroid hormone during surgical stress. This is hardly proof of either increased TSH secretion during the stress or of increased peripheral utilization afterwards in order to explain the normal blood levels of circulating hormone. DONGIER *et al.* (1956) studied the effects of acute emotional stress in the form of carefully planned stressful interviews in a series of twenty-eight patients. Using the serum $PB^{131}I$ as an index of thyroid activity, they found that the interviews

had no effect. Thus, in widely different situations known to activate the adrenal cortex (surgical interference of a major kind and discussion of psychologically distressing subjects), there is no unequivocal evidence from the literature that the response of the adrenal cortex to these stimuli affects the level of thyroid activity in man.

Our findings do not demonstrate any constant relationship between the activities of these two glands either in rate or direction of change. For example, the endogenous fluctuations in adrenocortical activity shown in cases 2, 3 and 4 were not accompanied by any variation in the indices of thyroid activity. Exogenous thyroid in the schizophrenic patient caused a reduction in TSH, as reflected in the 2-hr neck-thigh ratio. Corticoid excretion was high at first, and fell rapidly. The 17-Ks. then began to exhibit a slow steady rise, while the serum PBI was falling and then rose to normal levels. During this time TSH must have risen sharply and then fallen as the blood levels of endogenous thyroid hormones were restored to normal. It might be inferred from the findings that in this case long-continued exogenous thyroid administration did produce a fall in TSH, and that ACTH rose (thyroxine produces adrenal hypertrophy in the experimental animal: DEANE and GREEP, 1947; WALLACH and REINEKE, 1949), but that the relatively acute changes in the level of thyroid activity following withdrawal of exogenous thyroid were not accompanied by any inverse changes in adrenocortical activity. In case 1, where variations in the levels of activity of both glands were demonstrated, these appear to be unrelated, except for the rise in ASFS in the second period shown, which is in phase with the rise in serum PBI, and here the direction of change is the same. Also in case 5, where a sharp fluctuation in the unstable thyroid state was observed, the general tendency was for the indices of activity of the two glands to rise and fall together.

The discrepancies between our findings and those in the experimental animal where different techniques for the measurement of thyroid activity were used might raise the question that the serum PBI may not provide a true index of thyroid activity because of altered rates of peripheral utilization of thyroid hormone during periods of adrenocortical activity. That this is most probably not the case has been demonstrated by INGBAR and FREINKEL (1954), who presented clear evidence that cortisone does not affect the rate of peripheral utilization of thyroid hormone.

In terms of our measures of adrenocortical activity, the fact that considerable increase in 17-Ks. may not be accompanied by fluctuations of similar magnitude in the corticoid metabolites measured in every instance could cast doubt upon the validity of our measures. Statistical examination of this question has been carried out in that case with the largest number of 17-Ks. and ASFS estimations. The product-moment correlation between these two is +0·659 per cent. This, when serial effects are taken into account, is found to be significant beyond the 0·1 per cent level, and so all reasonable doubt is removed regarding this question.

We have therefore found no evidence of an inverse relationship governing the interaction of the thyroid gland and adrenal cortex in these patients. There is clear evidence that large fluctuations in adrenocortical activity may occur without any coincident or resultant change in thyroid activity. There is some evidence that circumstances may exist when the activities of the two glands parallel each other.

As these conclusions began to emerge, we were interested to see what our methods would reveal in a study of proved thyrotoxic patients. Previous reports of low 17-Ks. excretion appear doubtful when the age and sex of the patients is taken into account.

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Recently, LEVIN and DAUGHADAY (1955) reported normal urinary 17-Ks., and normal values of both urinary and plasma 17-hydroxycorticosteroids for thyrotoxic patients. They also present evidence for an increased rate of degradation of hydrocortisone in these patients. Normal plasma levels with an increased rate of degradation would suggest increased adrenocortical activity. It is possible that this increased activity might be reflected in high normal or increased urinary steroid excretion if a method for corticoid metabolites (including, for example, the trihydroxy side-chain compounds) were used, whereas measures of Porter-Silber chromogens or of free corticoids only would show normal or even low values, as reported. Table 1 shows figures compatible with this view, and they suggest that in thyrotoxicosis the adrenal cortex remains active often at a level around the upper limit of normality.

From the psychiatric standpoint the data presented here are important in indicating that endogenous fluctuations in adrenocortical activity in patients suffering from various psychiatric disorders do not inhibit the body's chief regulator of metabolism. The finding of a high normal or increased adrenocortical activity in established thyrotoxicosis requires confirmation in a larger series, but is relevant to consideration of the part played by emotional stress in the pathogenesis of Graves disease. We have not observed obvious correlation of emotional or mood changes with fluctuations in thyroid activity in the psychiatric patients studied so far.

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SUMMARY

(1) Attention is drawn to the conflicting reports in the literature of the interaction of the thyroid gland and adrenal cortex and the dependence of present knowledge on animal experiments and pharmacological effects in man.

(2) Findings in the course of serial investigations of endocrine function in psychiatric patients have been presented for the purpose of examining thyroid-adrenocortical inter-relationships.

(3) No evidence of an inverse relationship between the glands was found.

(4) Large variations in adrenocortical activity did not affect thyroid function.

(5) In five out of six thyrotoxic patients, not psychiatrically ill, urinary steroid excretion was high normal or increased.

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J. Psychosomatic Res., 1957, Vol. 2, pp. 236 to 241. Pergamon Press Ltd., London

REPORT OF MEETING

THE Third European Conference on Psychosomatic Research was held in Copenhagen from 7–11 May, under the Presidency of Prof. VILLARS LUNN. The programme was as follows.

WEDNESDAY 8 MAY

Morning 9.00–12.30. *Anorexia nervosa*

KAI TOLSTRUP, physician, Copenhagen: Introduction.

E. BLICKENSTORFER, priv.-dozent, Zürich: Healing of a Young Woman Sick to Death with Anorexia nervosa by Special Psychotherapy.

Prof. A. JORES, Hamburg, and E. THIEMANN, physician, Hamburg: Experiences from the Treatment of Thirty Cases of Anorexia nervosa.

BERTHA SOMMER, M. D. Stuttgart-Sonnenberg: Ego-Identity and Anorexia nervosa.

CHARLES DURAND, médecin-directeur des "Rives de Prangins", Nyon, Switzerland: Psychogénése et Traitement de l'Anorexie mentale.

Discussion.

ELSA-BRITA NORDLUND, physician-in-chief, Stockholm.

P. REITER, physician-in-chief, Copenhagen.

V. SMIRNOFF, physician, Paris.

L. VAN DER HORST, professor of psychiatry, Amsterdam.

Afternoon 14.00–17.00. Panel discussion on the theory of Hilde Bruch.

HILDE BRUCH, associate clinical professor of psychiatry, Columbia University, New York.

N. JUEL NIELSEN, physician, Copenhagen.

TORBEN IVERSEN, physician, Copenhagen.

FLEMMING QUAADE, M.D., Copenhagen.

KAI TOLSTRUP, physician, Copenhagen.

LISE OSTERGARD, clinical psychologist, Copenhagen.

THURSDAY 9 MAY

Morning 9.00–12.30. *Conditioning*

Dr. J. O. WISDOM, London: Introduction.

B. NOELPP, M.D., Basel, Switzerland.

GWYNNE JONES, Ph.D., lecturer in psychology, London: The Role of Learning in the Development and Treatment of Psychosomatic Disorders.

CYRIL M. FRANKS, Ph.D., London: The Application of Classical Conditioning Techniques to some Problems in Clinical Psychiatry.

BRIAN ACKNER, psychiatrist, London: E.E.G. and Vasomotor Conditioning to Repetitive Stimuli during Sleep.

L. A. LIVERSEDGE, lecturer in neurology, Manchester: Conditioning Treatment of Writers Cramp.

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E. DEKKER, physician, Amsterdam, H. G. PELSER, physician, Amsterdam, and J. GROEN, physician-in-chief, Amsterdam: Conditioning as a Cause of Asthmatic Attacks. A Laboratory Study.

RONALD MACKEITH, physician, London: Conditioning as a Hopeful Concept in Clinical Medicine.

FRIDAY 10 MAY

Morning 9.00–12.15. *Treatment* I

H. STOCKHOLM, lecturer in psychiatry, Risskov, Denmark: Introduction.

G. S. PHILIPPOPOLOUS, psychiatrist, Athens: Psychoanalytically Oriented Psychotherapy in Psychosomatic Disorders.

F. ANTONELLI, physician, Rome: Profits and Risks of the Pharmacologic Treatments of Psychosomatic Disorders.

Prof. Dr. H. HOFF, professor of psychiatry, Vienna, and E. RINGEL, physician, Vienna: Zur Frage der Therapie psychosomatischer Erkrankungen.

P. KIRKETERP, physician-in-chief, Horsens, Denmark: A Physician's Approach to Therapy.

Afternoon 14.15–17.15. *Treatment* II

DENIS LEIGH, psychiatrist, London: Individual Therapy of Asthma.

J. GROEN, physician-in-chief, Amsterdam, and H. E. PELSER, physician, Amsterdam: Group Psychotherapy in Bronchial Asthma.

J. T. BARENDREGT, psychologist, Amsterdam: A Psychological Test of the Effects of Group Psychotherapy on Patients with Bronchial Asthma.

D. LUMINET, physician, Bruxelles: Individual Therapy of Asthma Bronchiale.

SATURDAY 11 MAY

Morning 9.00–11.00. *Free Papers Section* I

M. BELEZOS, physician, Athens: Skin Diseases and the Psychosomatic Approach.

PETER SAINSBURY, director of research, Chichester, Sussex: A Method of Measuring and Some Findings on Psychomotor Activity.

H. FREYBERGER, physician, Hamburg: Group Therapy in Cases of Adipositas.

J. W. PAULLEY, physician, Ipswich: Emotional and Personality Factors in Idiopathic and Postgastrectomy Steatorrhoea.

Free Papers Section II

ARVID ÅS, clinical psychologist, Oslo: Mutilation Phantasies and Autonomic Response.

H. CARPELAN, physician, Helsingfors: Psychiatric Disease after Thyreoidectomy.

L. BAGGE, physician, Lund: Metropathia haemorrhagica.

H. G. MANTHEY, physician, Hamburg: Psychological Studies in Cases of Male Gonadal Insufficiency.

H. BLIJHAM, physician, Groningen: Psychosomtic Aspects in Gynaecology.

A Business Meeting was also held. It was decided that the next Conference should be held in 1959 in Hamburg, under the Presidency of Prof. A. JORES. No decisions were taken as to the formation of an organized society, the informality which has characterized each conference having produced most successful and fruitful meetings. The responsibility for the organization of the meeting in Hamburg will fall on Prof. JORES. His address is Prof. ARTHUR JORES, Second Med. Univ. Klinik, Eppendorfer Kraukenhaus, Hamburg, Germany.

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BOOK REVIEWS

H. S. LIDDELL: **Emotional Hazards in Animals and Man.** C. C. Thomas, Springfield, Ill., 1956. xi + 97.

DR. LIDDELL is a pioneer in the field of conditioning and the experimental production of stress in animals. He has been active for over three decades and his numerous contributions to the literature are both important and widely recognized. The present volume, although interesting and thought provoking, is unfortunately an inadequate presentation of his many researches.

It consists of six chapters, each of which is based upon a lecture presented by the author to the psychiatric residents of the Canadian Maritime Provinces. The first chapter, entitled "A Clinical Demonstration", describes the production of experimental neuroses in animals under stress in his laboratory. The remaining chapters represent an attempt to understand artificially produced chronic emotional disorders in animals (Dr. LIDDELL rightly prefers this longer designation to PAVLOV's more misleading term "experimental neurosis") and to relate these abnormalities to problems of stress and neurotic disorder in man. According to Dr. LIDDELL, the emotional hazards of man (loneliness, monotony, confusion, and overstimulation) can also be encountered and identified during conditioning in animals. For those interested in the training of horses a special addendum is provided.

It is not easy to survey the literature and consider conflicting data and alternative hypotheses in six fairly general lectures. On the other hand, no discussion of the fundamental issues raised by Dr. LIDDELL can afford to omit a consideration of the attempts of psychologists such as HULL, MOWRER, MILLER, and DOLLARD to describe human behaviour in terms of learning theory and conditioning. In the present volume mention is made neither of any of these authors nor of any animal psychologists. In an attempt to be objective and quantitative, Dr. LIDDELL writes of a continuum, ranging from thinking at one end to emotional expression and control at the other. The evidence for this rather strange dimension seems to be totally lacking, either in the book under review or elsewhere.

One methodological difficulty which Dr. LIDDELL makes no attempt to evade is that of the phylogenetic gap between animals and man. Such a gap makes it difficult, for example, to evaluate the import of Freud's concept of childhood psychic trauma in terms of the life-cycle of the sheep. Throughout the relevant chapters runs the tacitly accepted assumption that mother-child separation in humans is highly likely to have permanently disturbing effects on the child. Dr. LIDDELL quotes the findings of well-known psychoanalysts such as SPITZ in support of this contention but ignores completely the considerable body of evidence to the contrary, assembled most convincingly by ORLANSKY and by numerous workers in the Iowa Child Development Center.

An interesting comparison is made between the behaviour of animals about to develop an emotional breakdown under the stress of laboratory conditioning and men under stress in the front line of battle. Despite many similarities, man is apparently at a considerable advantage because he is "both animal and idealist" and can call upon resources such as creative impulse, loyalty, moral values, and religious experience to help him. Such an interpretation would be perfectly permissible if the author did not claim to be an objective psychologist and to be following in the tradition of PAVLOV. It may be that Dr. LIDDELL is aware of this dilemma and the polemic which it must arouse. His solution is to assert, supported by a suitably chosen quotation, that PAVLOV, like himself, was "from first to last the uncompromising and aggressive idealist". Once more alternative evidence remains unconsidered; it would be by no means an onerous task to match the chosen quotation with others to the contrary. Thus PAVLOV regarded man as "a system—roughly speaking, a machine—like every other system in nature subject to the unescapable and uniform laws of all nature".* There is little doubt that PAVLOV would have explained man's superiority to animals in mechanistic terms such as the advantages of possessing a secondary signalling (speech) system.

C. M. FRANKS

* I. P. PAVLOV: **Conditioned Reflexes and Psychiatry** (transl. by W. H. GANTT) New York, International Publishers, 144 pp. 1941.

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MORRIS S. SCHULZINGER: **The Accident Syndrome; The Genesis of Accidental Injury.** C. C. Thomas, Springfield, Ill., 1956. 234 + xxiii pp.

THIS book is based on the author's personal experience of 35,000 accident cases, both industrial and otherwise, over a period of 25 years. The material has been examined to determine when, to whom, and in what circumstances accidents are likely to occur.

The following are some of the conclusions reached by Dr. SCHULZINGER. The accident syndrome consists of certain recognizable circumstances which, with a trigger mechanism or event, influence or determine the accident. The occurrence of a number of these factors in an individual or his environment gives rise to a state of accident proneness, which may be of long or very short duration. Two-thirds of all accidents are "due to the relatively infrequent solitary experiences of large numbers of individuals", and the concept of a small group of people who are responsible for the majority of accidents is wrong; the accident-prone are a changing population. There is a higher incidence of accidents in youth, in males, and among the irresponsible and maladjusted.

These conclusions are probably sound, but the wealth of figures quoted (there are 100 pages of charts and tables) gives an appearance of mathematical accuracy which is not entirely justified. Statistically, the figures may be flawless, but there is opportunity for inaccuracy in their determination. For instance, non-industrial accident cases have been divided into two groups on a basis of failure to pay the physician's bill. These groups are the basis of much of the analysis. Those who did not pay are regarded as irresponsible and maladjusted (why maladjusted?). There are inevitably a number of irresponsible and maladjusted people who did pay their bills, and no account is taken of the social or other reasons that may have led to non-payment. There is some repetition in the book, partly engendered by its somewhat unusual layout.

For future efforts Dr. SCHULZINGER considers that more attention should be paid to the psychological and environmental background of accidents. Further improvement as a result of safety devices and campaigns is unlikely.

The book is interesting and contains a mass of information which will be of use for reference, but the reader must satisfy himself as to the validity of any particular conclusion. It is stimulating, and may provoke useful study by those who deal with trauma, upon whose observations others must depend for their information.

PETER H. SCHURR

Hypotensive Drugs. Edited by M. HARINGTON, M.B., M.R.C.P., Pergamon Press, London, 1957. 50s.

THIS book contains the proceedings of a symposium held at the Wellcome Foundation last year on hypotensive drugs and the control of vascular tone. The participants came mainly from Great Britain, but included Prof. BARTORELLI from Italy, Drs. FOLKOW and HOOD from Sweden, Prof. PERERA from New York, and Dr. TRIPOD from Basle. Dr. ZAIMIS was responsible for much of the organization, and the great success of the meeting was in large part due to her. Of particular interest are the sections on the biochemistry and pharmacology of hypotensive drugs. There was also a valuable session on the clinical use of hypotensive agents, the chief speakers being MCMICHAEL, SMIRK, BARTORELLI, and HOOD, with PERERA providing an important critical appraisal of the present-day position. This book should be read by all who use anti-hypertensive agents.

R. I. S. BAYLISS

C. F. FLUHMAN: **The Management of Menstrual Disorders.** W. B. Saunders Company, Philadelphia and London 1956. xii + 350 pp., 59s. 6d.

THIS is a scholarly work, one of those delightful American books which are a credit alike to the author, printers and publishers. It should find a place on the shelves of psychiatrists and internists, as well as gynaecologists. The menstrual cycle is of fundamental significance in any psychosomatic study involving women, and a knowledge of its physiology and pathology is obligatory. Here in a most

concise, yet pleasing way, the author presents the fruits of his wide learning, quoting work from nearly all countries, and yet again showing that the best gynaecologists are indeed true physicians. The psychiatrist can turn to subjects such, for example, as the pre-menstrual tension syndrome, or anorexia nervosa, and find a balanced account of these conditions, free from prejudice, quoting the most important authorities, and described in a wholly admirable manner. Psychosomatic study of the whole menstrual process and its disorders is as yet in its infancy. This book gives an invaluable account of the background upon which further researches can be carried out. It is reasonably priced, the index is good, and all in all, it bears the stamp of a superior knowledge and intellect.

DENIS LEIGH

Personality, Stress and Tuberculosis. Edited by P. J. SPARER, International Universities Press, Inc., New York, 1956. xviii + 629 pp., $12.50.

THIS is the most comprehensive account of the psychological aspects of tuberculosis yet to have appeared, and the best. Previous studies have been either anecdotal, or concerned with particular aspects of the problem, and there has been a real need for such a book as this. Professor SPARER takes the view that "Among the tuberculous, there is no prototype but a broad range of personality structure extending from the 'normal' throughout the continuum of maladjustment represented by the psychoneurotic, psychophysiologic, psychotic and personality disorders. The high incidence of psychiatric disorders among the tuberculous is considered not to be due to the disease but to pre-existing personality dysfunction which renders the individual more vulnerable to the disease, and which may be accentuated by it." The ensuing series of contributions are devoted to a broad study of the problems—ranging from reviews of the hypothalamus and of endocrine functions in the tuberculous, to a chapter by HANS SELYE on recent progress in stress research with reference to the disease, and a study of Skid Road alcoholic tuberculous patients.

One of the most interesting chapters is by THOMAS H. HOLMES entitled "Multidiscipline Studies in Tuberculosis." Using techniques from sociological, psychological and physiological disciplines, patients in Seattle were studied in various stages of treatment and rehabilitation. The findings showed that the patients frequently began life with an unfavourable social status, growing up in a hostile environment, strangers to the American scene. Disintegration of the patient's precarious psychosocial adjustment almost invariably occurred in the two year period preceding the onset or relapse of the disease. Alcoholism, psychosomatic disorder, broken marriages and job changes were frequent. On the physiological side HOLMES found changes in 17-ketosteroid excretion, suggesting that adreno-cortical activity played a role in resistance to tubercle, and that the effects of stress might be mediated through the adrenals.

Irregular discharges are very fully dealt with in excellent chapters by CALDEN, LEWIS, LORENZ and THURSTON, and by WITTKOWER and RUSSELL. The alcoholic tuberculous patient is the subject of a fascinating study by Miss JACKSON, who has the intriguing post of Research Instructor in the Department of Psychiatry at Seattle. The wealth of information in this enlightened and progressive book is such, that this reviewer cannot do full justice to all the authors, except to heartily recommend its purchase to all chest physicians, and all those psychiatrists who work in general hospitals or the community at large. Professor SPARER has produced a very fine book.

DENIS LEIGH

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PSYCHOSOMATIC ASPECTS OF PRE-ECLAMPTIC TOXAEMIA

ALEC J. COPPEN, M.B., CH.B.*

INTRODUCTION

IT is the purpose of the following investigation to discover whether psychological factors and body-build are of importance in the aetiology of pre-eclamptic toxaemia.

Pre-eclamptic toxaemia was taken to be present when two of the following criteria were found:

(1) A blood-pressure rising from normal to 140/90 or above; or a rise of 30 mm mercury in the systolic and 15 mm diastolic if the blood-pressure was not normal initially. (The blood-pressure readings to be observed on two occasions not less than 12 hr apart.)

(2) The presence of albuminuria.

(3) Oedema in the upper half of the body.

Cases of chronic hypertensive disease without superimposed toxaemia, primary renal disease without superimposed toxaemia, were excluded from the investigation.

Very few of the great number of papers dealing with the psychosomatic aspects of medicine and surgery have dealt with pre-eclamptic toxaemia. KROGER and FREED (1951), in their review of psychosomatic gynaecology, could produce only one paper dealing systematically with the personality of the pre-eclamptic patient, that by MCNEILE and PAGE (1939). These authors examined the personality of normal, pre-eclamptic, and essential hypertensive pregnant women by means of a personality questionnaire. This comprised fifteen questions, nine of which referred to personality traits, in which the patient had to rate herself with regard to being "unusually highly strung," "quick-tempered," "excitable," "sensitive," "embarrassed," "serious," "shy," or "easily worried." On the basis of these questions and a further seven questions dealing with family history of hypertension and "psychomotor activity" and "autonomic imbalance," the authors stated that there was only a clear-cut distinction between the patients with essential hypertension and patients in other categories.

Several obstetricians have described the importance of emotional factors in some cases of pre-eclamptic toxaemia. PAGE (1953), for instance, describes the case of a primipara who left his antenatal clinic one afternoon with a normal blood-pressure and urine and was arrested on suspicion of a felony. She was returned from gaol the following morning because of convulsions, a blood-pressure of 210/140, and proteinuria. He felt that "acute emotional episodes precede the onset of fulminating toxaemia sufficiently often as to warrant serious reflection on the causal relationship". DIECKMANN (1952), after reviewing evidence on geographical distribution and climatic effects, writes: "Our data seem to indicate that toxaemias of pregnancy, especially

* Registrar, The Bethlem Royal and The Maudsley Hospitals.

eclampsia, are diseases of culture and civilization, probably because of mental strain and changes in diet and habits". GARRETT (1950) considers that eclampsia is a reaction to stress, emotional and physical, of sufficient intensity to cause an "alarm" reaction of SELYE.

SOPHIAN (1955), in his discussion of the utero-renal reflex, found that the emotional difficulties of the early days of marriage, usually contemporaneous with primagravidity, would help to aggravate the factors responsible for toxaemia. He quotes the work of WOLF *et al.* (1948) in showing that emotional factors could lower renal blood-flow, and that this was associated with a rise in blood-pressure. WALSER (1948) pointed out that fear may contribute to the production of pre-eclamptic toxaemia, not only by nervous and humoral effects directly producing hypertension, but also indirectly by causing the nervous, insecure patient to overeat.

WIEDORN (1954) in an interesting paper, showed that the incidence of pre-eclamptic toxaemia was much higher in those patients who, before pregnancy, had had a schizophrenic illness or had later developed such an illness. Compared with 22·2 per cent of a control group, 49·6 per cent of his schizophrenic group had pre-eclamptic toxaemia. In primiparae who had had a child *before* the onset of schizophrenia, the figure was as high as 83·3 per cent. These results, if confirmed, are most striking, although their bearing on the aetiology is obscure. WIEDORN suggests that in these patients, at any rate, pre-eclamptic toxaemia represents a "psychotic equivalence on a physiologic level of response of the organism" to stress, but this explanation is unsatisfactory, as he produces no evidence that pregnancy is in any way more stressful for these patients than for any other group of pregnant mothers. SELYE (1946, 1951) writes that pre-eclamptic toxaemia often follows stress, but was not certain whether it should be regarded as a disease of hyper- or hypo-adaptation. GARM (1950), discussing bovine parturient paresis, an eclamptic-like syndrome, states that in some cases it arises when an animal has been exposed to nervous strain. PAVIAINEN *et al.* (1949) regard pre-eclamptic toxaemia as a disease of adaptation.

There is a considerable literature on the psychosomatic aspects of hypertension, one of the cardinal signs of pre-eclamptic toxaemia. This subject is well reviewed by HAMILTON (1955). The findings of WOLF *et al.* (1948) are characteristic of many workers in this field. Fifty-eight hypertensive patients were studied, forty-two non-hypertensive patients, and one hundred and fifty subjects with asthma and hay-fever. The hypertensive patients had a marked rise in blood-pressure compared with the other groups, when topics of an emotionally disturbing nature were discussed in the interview situation. There was also a more marked diminution in renal blood-flow. The hypertensive subjects were "more square and muscular than average"; their personalities contained much repressed hostility. "Under a facade which was often affable and easy-going, they were tense, wary, and suspicious, afraid of committing themselves". As children, they were usually shy. BINGER *et al.* (1954) studied twenty-four patients. In twenty-three of these, hypertension was discovered following an acute emotional stress, usually the loss of a dependent relationship. The essential conflict was felt to be between a passive dependence and aggressive hostile impulses. They point out cautiously, however, that these conflicts may often be found in patients who do not develop hypertension and that there must be some somatic predisposition before the signs appear.

Anthropological surveys in connection with the incidence of pre-eclamptic

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toxaemia appear to be mainly confined to dietary differences. BELL and WILLS (1955) surveyed the dietary habits of the Fijian and Indian population of the Fiji Islands, where there is a well-known difference in the incidence of pre-eclamptic toxaemia in the two races, recent figures being Fijian 1·8 per cent and Indian 8·5 per cent. After noting the high "fibre" content of the Fijian diet, the authors remarked that perhaps it is in the different way of life generally, rather than the dietary differences, that the explanation for the different incidence may be found. They contrasted the happy communal life of the Fijians with the more stressful life of the Indians, with their marriage debts, litigation, and pre-occupation with money to be used for revisiting India.

METHODS

Fifty patients with pre-eclamptic toxaemia were examined and compared with fifty control patients. All the patients were primiparae. The toxaemic cases were seen as soon as possible after admission to the antenatal ward, and were unselected consecutive admissions with the exception of four patients who were considered to be too ill to be subjected to tests and one patient who refused to co-operate.

The controls were matched for age, parity, and time in pregnancy examined, but apart from these considerations were selected at random from the antenatal clinic. The controls did not in any sense volunteer, but were told that another doctor wanted to see them. They were interviewed in a quiet room away from the antenatal clinic. The purpose of the examination was explained, and without exception excellent co-operation was obtained from these controls. Once their quite reasonable concern about why they had been selected—"Why pick on me?"—had been satisfied, many welcomed the long, informal interview as an opportunity to ask questions and air anxieties about their pregnancy and coming labour. One control did, in fact, subsequently develop eclampsia, the only case in the series. It is interesting to note that her rating was typical of the toxaemic rather than the control group. It will be seen, therefore, that all patients were examined ante-natally.

The examination consisted of:

(1) A psychiatric interview.

(2) A personality questionnaire.

(3) Various anthropometric measurements.

The psychiatric interview was designed primarily to enable a rating on a five-point scale to be made on seventeen items. These items are shown in the Appendix.

The rating was performed on a five-point scale, from grade 0 indicating minimum disturbance, to grade 4 indicating maximum disturbance. It was possible to define more exactly what each grade represented in some items. These definitions will be described under the appropriate headings.

It was feared that interviewing patients admitted to hospital with an illness due to pregnancy might cause them to retrospectively distort their account of sexual and menstrual history and their attitude to the coming child. This, however, is probably less marked in toxaemia than in other illness such as peptic ulcer, where prolonged pain and invalidism occur. The majority of patients did not feel themselves to be physically ill (a difficulty commonly experienced by doctors keeping these patients in hospital). They are reassured on coming into the antenatal ward and seeing other patients, not obviously ill, in the same position as themselves. To investigate this point further, 20 per cent of the toxaemic series were seen six months after their babies had been delivered and were rated again on these items, which were compared with their previous ratings. Only two cases differed from their previous ratings; the difference was slight and in both cases it was felt that the patients' difficulties with regard to sex and the attitude to the child had been under-estimated. However, for the purpose of statistical comparison, the original ratings were used.

Throughout the statistical work the 5 per cent level is regarded as the minimum acceptable level of significance.

RESULTS OF ITEMS ASSESSED ON THE INTERVIEW

Family history

This followed the normal psychiatric history and included details of age, health, occupation, personality of parents and siblings, and their emotional relationships to the patient. The parents', especially the mother's, attitude to sex and to menstruation was noted. This, according to DEUTSCH (1947), is of the greatest importance in determining the attitude of the patient to menstruation and sex.

The rating was performed on the *present* disturbing elements in the relationship with the family, e.g. quarrels with parents, mother disapproving of marriage or pregnancy, etc. Ratings ranged from grade 0—no disturbing features, to grade 4—indicating a very disturbing relationship. The results are shown in Tables 1, 2 and 3

TABLE 1.—RELATIONSHIP WITH MOTHER

Rating	0	1	2	3	4
Toxaemia group (50)	27	5	11	6	1
Control group (50)	27	12	10	1	—

Chi-square = 4·5 Not significant

TABLE 2.—RELATIONSHIP WITH FATHER

Rating	0	1	2	3	4
Toxaemia group (50)	30	10	6	2	2
Control group (50)	26	13	11	—	—

Chi-square = 0·895 Not significant

TABLE 3.—RELATIONSHIP WITH SIBLINGS

Rating	0	1	2	3	4
Toxaemia group (50)	32	5	6	4	3
Control group (50)	31	16	3	—	—

Chi-square = 12·03 $p < 0.01$

These results indicate that the only significant difference between the two groups lies in the rating for the relationship to the siblings. This poor rating was usually due to quarrels and jealousy which had existed for some years. On the whole, the patients talked much more freely about their antagonistic feeling toward siblings than toward

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their parents, and probably this rating should be regarded as an index of disturbed family relationships as a whole.

It is difficult to give any general qualitative account of the family background of the toxaemic patients, but there does seem to have been a higher incidence of over-dependence on the mother in this group, though this was certainly not a consistent characteristic. It is not surprising that the family relationships do not show a consistent pattern. If, for example, one were to seek in the family history for the type of emotional background that may produce frigidity, a symptom which is shown below to be a prominent feature of the toxaemic group, one would expect a diverse picture. For instance, HITSCHMANN and BERGLER (1936) listed no less than eighteen psychological patterns of frigidity related to early emotional difficulties resulting from disturbed family relationships. With these possible multiple aetiological factors, it is not surprising that no consistent pattern emerged from the family history.

Neurotic symptoms in childhood; adjustment to school and work

These assessments were made as an index of personality development and of neuroticism (SLATER, 1943). The history taken was on the lines of the normal psychiatric history (MAYER-GROSS *et al.* 1954), and included enquiries into night terrors, sleep-walking, tantrums, wetting the bed, thumb-sucking, nail-biting, faddiness about food, stammering, fear states, truanting, delinquency, shyness, etc.

TABLE 4.—NEUROTIC SYMPTOMS IN CHILDHOOD

Rating	0	1	2	3	4
Toxaemia group (50)	13	20	12	3	2
Control group (50)	10	22	16	2	—
Chi-square = 1·6 Not significant					

Ratings ranged from grade 0—minimum symptoms, to grade 4—symptoms which had warranted or had received psychiatric treatment; evidence of serious maladjustment as a child.

TABLE 5.—ADJUSTMENT AT SCHOOL

Rating	0	1	2	3	4
Toxaemia group (50)	20	17	10	2	1
Control group (50)	23	20	6	1	—
Chi-square = 2·4 Not significant					

Adjustment at school was based on whether academic achievement was consistent with estimated intelligence and subsequent achievements, on relationships with other children and teachers, attitude to games and general activities.

Ratings ranged from grade 0—good adjustment at school, to grade 4—very poor adjustment with regard to the points assessed.

TABLE 6.—ADJUSTMENT AT WORK

Rating	0	1	2	3	4
Toxaemia group (50)	36	9	4	1	—
Control group (50)	36	7	7	—	—
Chi-square = 0·5 Not significant					

Adjustment at work was based on the number of jobs held and reasons for changing jobs; relationship with fellow-workers and superiors; ambitions achieved or failed.

Ratings ranged from grade 0—well adjusted, to grade 4—representing severe difficulties at work with regard to points assessed.

There was no significant difference in any of these three ratings.

Psychiatric symptoms

An attempt was made to assess the psychiatric symptoms experienced before and during the pregnancy, and to try to evaluate the effect of pregnancy on the patient's emotional state. Patients were questioned concerning depression, anxiety and its somatic manifestations, insomnia, mood swings, guilt feelings, pre-occupation with bodily health, obsessional features, and hysterical disturbances. Enquiries were made about previous psychiatric treatment, sought and obtained. Ratings ranged from grade 0—minimum symptoms, to grade 4—symptoms severe enough to have warranted or to have received psychiatric treatment. The results are shown in Table 7.

TABLE 7.—PSYCHIATRIC SYMPTOMS BEFORE PREGNANCY

Ratings	0	1	2	3	4
Toxaemia group (50)	13	15	17	4	1
Control group (50)	17	16	14	2	1
Chi-square = 1·45 Not significant					

TABLE 8.—PSYCHIATRIC SYMPTOMS DURING PREGNANCY

Rating	0	1	2	3	4
Toxaemia group (50)	5	3	19	17	6
Control group (50)	18	17	15	—	—
Chi-square = 39·6 $p < 0{\cdot}001$					

There is no significant difference in the psychiatric symptoms before pregnancy, but a very significant difference during pregnancy.

TABLE 9.—EFFECT OF PREGNANCY ON PSYCHIATRIC SYMPTOMS

Rating	Better in pregnancy	The same	Worse in pregnancy
Toxaemia group (50)	1	12	37
Control group (50)	16	21	13
Chi-square = 28·4		$p < 0{\cdot}001$	

Most authors (HIRST and STROUSSE, 1938; THOMPSON, 1942; KLEIN, 1950; KROGER and FREED, 1951) agree that practically all pregnant women experience anxieties about their pregnancies, labour, and coming child. The subjects in the present series presented similar anxieties. So far as the labour was concerned, many were afraid of the anticipated pain, of losing control of themselves and screaming, but few entertained fears of dying. Those who had attended relaxation classes felt they had benefited from these, while others felt they did not want to know any details of what to expect beforehand—they tried not to think about it. There were many fears about the health of the coming child, whether it would have any congenital defect, especially mental deficiency. Some were afraid that continuing sexual intercourse during pregnancy might harm the child, yet they hesitated to offend their husbands by refusing it. The rhesus factor was the source of considerable anxiety. It was common, too, for obvious environmental stresses such as housing, finance, etc. to be exaggerated. These will be dealt with under the appropriate heading.

These anxieties were common to both groups, but they varied a great deal in intensity and in the patients' reactions to them. On the whole, the control group felt generally better from an emotional and psychiatric point of view, during pregnancy. If psychiatric symptoms had been present before, these tended to improve, and many said they felt better than they had ever done before, during this time. "I don't seem to worry as I used to," or, after discussing some of their anxieties, "I would have been worried stiff before I became pregnant, but I can take it in my stride now." Apart from the much more intense pre-occupation of the toxaemic group with the common anxieties of pregnancy, their most marked psychiatric symptoms were mood swings, nearly always depression, increased irritability and sensitivity, insomnia, unreasonable fears of the husband's unfaithfulness. The depressions were often very severe, sometimes lasting a few hours, sometimes days. The insomnia followed the pattern of waking early in the small hours of morning rather than difficulty in going to sleep. If these symptoms were present in the control group, they seldom reached the same intensity. It is interesting to note that the exacerbation or onset of psychiatric symptoms usually appeared early, within the first four or five months and, indeed, would seem to rank as an important prodromal symptom of toxaemia. Psychologically, the severity of psychiatric symptoms in the toxaemic group appears to be related to adjustment to pregnancy and the coming child, which, as will be shown below, presents unusual difficulties.

Menstruation

That menstruation is affected by psychological factors is well known, especially with regard to anxiety-produced amenorrhoea. There is also a considerable amount of psychosomatic literature dealing with all aspects of the menstrual cycle. As BENEDEK (1952) wrote, "We still look upon menstruation as the cornerstone of female development where biological, sociological, and psychological factors meet, marking the point at which adaptation to the female sexual function may succeed or fail".

During the interviews a full menstrual history was taken and each patient rated

on (a) emotional disturbance at the menarche, (b) pre-menstrual tension, (c) dysmenorrhoea.

Emotional disturbance at the menarche

The appearance of the first menstrual period is one of the most important events in a girl's psycho-sexual development. Here is unmistakable evidence of her femininity, and her experience at this time will not only be an index to her previous psychosexual development, but events at this time will also colour her future attitude to sex and menstruation.

There are many reports in the literature showing that this period can be psychologically traumatic. DEUTSCH (1947) quotes a number of cases of attempted suicide, and CHADWICK (1932) describes psychological events at this time and the attitude of primitive communities where menstruation is surrounded by taboos and superstitions. Very often a girl at her menarche is regarded as a threatening public menace and is secluded in various ways. Among the many powerful influences conditioning the girl's attitude to the menarche will be the mother's attitude to her own menstruation. If the mother's attitude has been one of consistent complaint or suffering, the daughter's attitude will be conditioned to one of fear and anxiety (DEUTSCH, 1947; KROGER and FREED, 1951).

In the present study numerous types of emotional response by the patients to their menarche were recorded. The following, for example, were rated as "Well adjusted": "I felt a woman at last", "I felt grown up", "It seemed quite natural". Disturbed responses indicated horror, a fear of bleeding to death, or having hurt oneself (especially cutting oneself), of its being dirty ("I didn't tell mother in case she punished me"). Ratings were as follows: Grade 0—no disturbance, pleased or proud about it; 1—neutral reaction; 2—slightly disturbing, some anxiety; 3—more disturbing, resentful; 4—very disturbing—fear, shame horror, reactions. The results of this investigation were as follows:

TABLE 10.—EMOTIONAL RESPONSE TO THE MENARCHE

Rating	0	1	2	3	4
Toxaemia group (50)	18	5	10	12	5
Control group (50)	34	8	7	1	—

Chi-square = 20·4 $p < 0{\cdot}001$

These figures indicate that the toxaemic group showed a very significantly increased incidence of emotional disturbance at the menarche compared to the control group. Often the patient would relate this disturbance to the fact that she had not been told about menstruation because "Mother couldn't talk about such things". Even, however, where the girl had been informed, there was sometimes quite a degree of disturbance. Some patients who had had a stormy menarche would report that they did not have a second period for some months. DEUTSCH (1947), commenting on this sequence of events, described it as a "shock reaction" provoked by the horror with which the first menstruation was received. Probably the commonest attitude of the toxaemic group towards the menarche and, indeed, to their menstrual periods later, was one of resentment.

Pre-menstrual tension

This subject has been well reviewed by KROGER and FREED (1951), but it may be useful here to consider some of the literature on this subject and also on the relationship between sex hormones and the mental state, as this has a considerable bearing on other aspects of this investigation.

Pre-menstrual tension was first described by FRANK (1931) and consists of a number of symptoms such as depression, irritability, inability to withstand the stresses and strains of life, a "bloated" feeling of the abdomen, swelling and tension of the breasts, headache, vertigo, nausea, backache, lassitude, increased predisposition to asthma or migraine. Not all of these symptoms are necessarily present in any one patient. They occur in the latter half of the menstrual cycle and usually clear up with the onset of the menses. It is known that crimes of violence and suicide are more common at this time (HANSE, 1924; ALLEN and HENRY, 1933).

GREENE and DALTON (1953) and DALTON (1954) found a high incidence of pre-menstrual tension among sufferers from pre-eclamptic toxaemia. Among the patients who had had pre-eclamptic toxaemia 86·4 per cent had severe pre-menstrual tension, which was present in only 26·6 per cent of the controls. They considered that the signs of pre-eclamptic toxaemia could be matched by those of pre-menstrual tension, where there may be a rise in blood-pressure, albuminuria, oedema and weight increase. They also described in pre-eclamptic toxaemia a stage of minor symptoms which precedes the major signs of toxaemia, and which are very similar to those of pre-menstrual tension—depression, nausea, lassitude, irritability and backache. This stage of minor symptoms is similar to the increase in psychiatric symptoms which have been described earlier in this paper.

REES (1953), in a careful study, found pre-menstrual tension more frequently in neurotic subjects, and that there was a correlation between the intensity of pre-menstrual tension, general instability, and neurotic predisposition. Some very neurotic women, however, might have no pre-menstrual tension. The results of treatment also indicated that there was no simple relationship between neuroticism and pre-menstrual tension. Neurotic women who improved psychologically with psychotherapy did not necessarily improve in their pre-menstrual tension. Women who improved from the point of view of their pre-menstrual tension with pharmocological treatment, did not necessarily improve as far as their state was concerned. He concluded that physiogenic as well as psychogenic factors were important. An emotionally disturbed menarche was twice as common in his pre-menstrual group as in his control group.

As to the mechanism of pre-menstrual tension, most authors are agreed that it is associated with water and salt retention. FREED (1945) considered that the salt and fluid retention was due to oestrogen; MAZER and ISRAEL (1947) that it was associated with a high level of oestrogen acting on the autonomic system. GILMAN (1942) stressed the importance of progesterone in producing the oedema, while PENDERGRASS *et al.* (1941) incriminated the posterior pituitary as the cause of fluid retention. MORTON (1950) felt that, apart from the changes resulting from oestrogens operating in the presence of an inadequate amount of progesterone, a lower blood-sugar during the pre-menstrual phase was responsible for the irritability and craving for sweet things. Nearly all these factors have been considered to be of importance in the aetiology of pre-eclamptic toxaemia (PAGE, 1953).

The work of BENEDEK (1952) also indicates an association between the mental state and sex hormones. She has amassed a great deal of material on this subject by correlating psycho-analytical interviews with vaginal smears. There was a significant correlation of the analytic material of the neurotic patients with phases of ovarian activity. For example, before and during ovulation high heterosexual drives and high oestrogen levels were found. After ovulation a diminishing sexual tension and a more passive receptive state was now associated with progesterone liberation from the corpus luteum.

There is also some evidence that the central nervous system is an important target organ for sex hormones. BEACH (1948) quotes evidence on this point. Progesterone injected directly into the lateral ventricle of the hamster produces the mating response after doses far below that required with subcutaneous injection, thus indicating the direct action of progesterone on nerve tissues. Castration also reduces the irritability of the autonomic nervous system in dogs; the hormones are also thought to influence the short arc reflex in the spinal cord. It can be seen, therefore, that if the somatic changes, especially hormonal disturbances, in pre-eclamptic toxaemia have similarities to those of

pre-menstrual tension, it is not surprising that psychological symptoms were found to be marked in the toxaemic group.

Ratings ranged from grade 0—minimum symptoms, to grade 4—severe symptoms which interfered with normal life and had received or warranted medical treatment. The results are shown in Table 11.

TABLE 11.—PRE-MENSTRUAL TENSION

Rating	0	1	2	3	4
Toxaemic group (50)	20	9	11	6	4
Control group (50)	26	11	13	—	—

Chi-square = 11·2 $p < 0{\cdot}02$

There is a significantly increased incidence of pre-menstrual tension among the toxaemic group.

Dysmenorrhoea

There is some evidence to suggest that primary dysmenorrhoea has important psychosomatic aspects.

WITTKOWER and WILSON (1940) studied fifty-seven unselected patients with primary dysmenorrhoea. They found, compared with a control group, a history of maladjustment as a child four times as often in the dysmenorrhoea group. Patients with dysmenorrhoea could be classified into two main personality types, the first "characterized by deep resentment of their feminine role; the second, obviously immature physically and either shy or shut-in or chronically anxious and complaintive." There was a much higher incidence of frigidity in the dysmenorrhoea group.

Ratings were performed as for dysmenorrhoea. The results of the present investigation are shown in Table 12.

TABLE 12.—DYSMENORRHOEA

Rating	0	1	2	3	4
Toxaemic group (50)	22	16	4	4	4
Control group (50)	26	17	3	4	—

Chi-square = 1·84 Not significant

The results show no significant difference between the two groups.

Attitude to sex

There are many classifications of sexual behaviour in women. The one used in this investigation was adapted from WEISS and ENGLISH (1943), and the ratings were made as follows:

(0) Regular orgasm, i.e. in over 50 per cent of intercourse.
(1) Occasional orgasm, i.e. in under 50 per cent of intercourse.
(2) Mild pleasure in intercourse but without orgasm.
(3) No pleasure; vaginal anaesthesia, but with no special aversion to intercourse.
(4) Dysparunia and/or vaginismus; and/or very distinct aversion to intercourse.

It was decided to limit the questions to marital sexuality, as it was felt that wider enquiries about sexual behaviour, extra-marital intercourse, homosexuality, masturbation, would bring forth only conventional replies and cause unnecessary offence. However, as far as marital intercourse was concerned, the patients responded to enquiries with great frankness and lack of embarrassment; several, indeed, raised the subject spontaneously before they had been questioned. The results of the enquiry are shown in Table 13.

TABLE 13.—SEXUAL ADJUSTMENT

Rating	0	1	2	3	4
Toxaemic group (50)	4	7	21	9	9
Control group (50)	15	19	13	3	—

Chi-square = 24·4 $p < 0.001$

For this investigation ratings 2, 3, and 4 will be classified as frigid. As can be seen, the toxaemic group has a very significant higher incidence of frigidity than has the control group. It is interesting to note that the incidence of capacity for orgasm, of the control group, 68 per cent, is in line with previous investigations both in this country and in America, as shown in Table 14.

TABLE 14.—INCIDENCE OF CAPACITY FOR ORGASM

WITTKOWER and WILSON (1940)	73 per cent
TERMAN (1933)	70 per cent
DICKINSON and BEAM (1938)	61 per cent
KELLY *et al.* (1954)	60 per cent
SLATER and WOODSIDE (1951)	50 per cent
HAMILTON (1929)	54 per cent

The findings of the items dealing with menstruation and sex will be discussed below.

Adjustment to the feminine role

An attempt was made under this heading to obtain an idea of the patient's adjustment to the feminine role, apart from sex and menstruation. On the whole, this proved difficult. However, an assessment was made on her attitude to such things as clothes and hair-do's, to work and running a home, to sport, dancing, films, to literature and general interests. Many of these factors are influenced by cultural background, intelligence, education, her husband, and so on. In spite of this, some women certainly did seem to have a more masculine outlook than others, whatever the cause, and this was accordingly rated. The results are seen in Table 15.

There is no significant difference between the two groups.

The next group of subjects to be discussed are adjustment to marriage, difficulties concerned with the home, and emotionally disturbing events not covered by

preceding items. This group as a whole will reflect the environmental disturbance to which the pregnant woman is being subjected.

TABLE 15.—ATTITUDE TO THE FEMININE ROLE

Rating	0	1	2	3	4
Toxaemic group (50)	13	24	12	1	—
Control group (50)	16	24	9	1	—
Chi-square = 0·739 Not significant					

Adjustment to marriage

Marital adjustment, apart from sexual adjustment, was rated under this heading. Many points were taken into consideration when assessing this item: the husband's age, work, and personality; duration of marriage; whether the marriage was precipitated by pregnancy; relationship to "in-laws"; quarrels; the husband's attitude to her pregnancy.

Ratings ranged from grade 0—happy marriage, to grade 4—very serious marital difficulties. The results are seen in Table 16.

TABLE 16.—MARITAL ADJUSTMENT

Rating	0	1	2	3	4
Toxaemic group (50)	32	7	7	2	2
Control group (50)	41	6	3	—	—
Chi-square = 5·76 Not significant					

This rating does not significantly differentiate the two groups. From a qualitative point of view, however, it is interesting to note how members of the toxaemic group tended to describe their husbands as "placid" or "very easy-going", who would not rise to what they often felt to be their frequent provocations. This item was not systematically rated and remains a clinical impression only.

Home difficulties

This item was intended to assess the amount of stress resulting from housing difficulties.

One of the major problems facing a newly-married couple today is finding suitable accommodation. Many start married life in one room in the parental home or in a furnished flat, with all the insecurity of tenure this implies. Many live in unsuitable rooms with no separate kitchen or bathroom; with unfriendly neighbours or landlords who can make life most unhappy for a woman at home all day. It was not unexpected in unsuitable housing, that a pregnancy should often be unwelcome. The quality of housing obtained sometimes depended to a large extent on personality factors. It would be the couple with friends and relatives eager to help them who would find the comparative haven of a

good unfurnished flat. The quiet, retiring couple, on poor terms with their families and unable to make friends easily, would be at a distinct disadvantage.

Ratings: grade 0—good housing; 1—reasonable housing; 2—poor housing; 3—unsuitable housing; 4— severe difficulties; no home; imminent eviction, etc. The results are set out in Table 17.

TABLE 17.—HOUSING DIFFICULTIES

Rating	0	1	2	3	4
Toxaemic group (50)	19	7	12	9	3
Control group (50)	27	5	11	5	1
Chi-square = 3·3 not significant					

There is no significant difference between the two groups.

Emotionally disturbing events during pregnancy

This item deals with emotionally disturbing events during pregnancy not covered by other items. The item concerned a wide range of subjects, but although it is not possible to give details, the majority of disturbing events fall into one of the following categories:

(1) Serious illness or death of a friend or relative.
(2) Financial worries.
(3) Quarrels with friends or relatives—especially "in-laws".
(4) Illegitimacy or pre-marital conception associated with guilt and family condemnation.
(5) Difficulties with husband's occupation; e.g. husband having to leave home because posted overseas in the forces; unemployment of husband.
(6) Medical anxiety about pregnancy; e.g. a patient who conceived shortly after an ectopic abortion and had been warned not to become pregnant for at least one year.

It should be observed that the emotional disturbance caused by these events depends very much on the personality and background of the patient. For example, pre-marital conception in some patients causes little upset, whilst in other patients it can be the cause of enormous guilt and family reprobation. Hence, each factor must be rated in the light of the patient's personal, family, and social history. The results are shown in Table 18.

TABLE 18.—EMOTIONALLY DISTURBING EVENTS DURING PREGNANCY

Rating	0	1	2	3	4
Toxaemic group (50)	18	2	12	13	5
Control group (50)	44	4	1	1	—
Chi-square = 32·6 $p < 0{\cdot}001$					

This shows that the toxaemic group was subjected to very significantly more disturbing events than was the control group.

Attitude to child

The rating under this heading was made to assess the mother's feeling towards her coming child, whether it was wanted, planned, or otherwise. The categories were as follows:

(1) Child desired and planned.
(2) Not planned, but pleased and accepted from the start.
(3) Not planned; upset at beginning of pregnancy, but the idea gradually accepted.
(4) Upset from the start; still does not want the baby, but will do her duty. No active rejection.
(5) Very upset at news of pregnancy; still highly hostile to having a baby and/or attempts made to have an abortion or immediate adoption.

A most useful question to elicit the mother's attitude to the child was: "What were your first reactions to learning that you were pregnant?" Enquiries were made about the failure of contraceptives. Some patients thought that pregnancy could only occur after an orgasm. The reasons given for not wanting a baby at a particular time varied from an obviously unsuitable environment to lack of money. Some were frivolous, others merely rationalizations: "I'm too young", "I want to keep going with my cycling". There were those who wanted a career or were adjusted and accustomed to many years of childless marriage. The results are shown in Table 19.

TABLE 19.—ATTITUDE TO CHILD

Rating	0	1	2	3	4
Toxaemic group (50)	15	7	13	11	4
Control group (50)	27	11	12	—	—

Chi-square = 19·4 $p < 0{\cdot}001$

The toxaemic group have a very significantly less welcoming attitude to the coming baby. Indeed, the very fact of being pregnant was a considerable emotional disturbance in itself for many of these women.

Vomiting and heartburn during pregnancy

In view of the psychosomatic work done on vomiting and heartburn during pregnancy, it was decided to include an evaluation of the incidence of these symptoms during the investigation.

Vomiting during pregnancy. The aetiology of hyperemesis gravidarum, in spite of many physiological and psychological investigations, remains obscure.

DELEE and GREENHILL (1943) were impressed by the value of suggestion in the treatment of this condition. "Hyperemesis gravidarum is amenable to suggestion and most of the cures we accomplish

are due to it." ROBERTSON (1946), in a controlled personality study of women who suffered from hyperemesis gravidarum, found disturbed coital functioning, undue attachment to their mother, and a history of previous dyspepsia.

KALTENBACH (1891) and ROEMER (1940) also felt that psychological factors were important. HARVEY *et al.* (1954) studied twenty pregnant women admitted to hospital for vomiting, and found a history of gastro-intestinal disturbance including vomiting in response to emotional disturbance, frigidity, and immaturity of personality. NORDMEYER (1946), however, in a study of eighty-five women applying for abortion, found that not one of them developed hyperemesis. Forty-four of these women had had an emotional illness.

In this series there was no case of vomiting severe enough to warrant admission to hospital. However, two "varieties" of vomiting could be distinguished—morning vomiting and vomiting that occurred as frequently at other times of the day as in the morning. This is in regard to vomiting starting early in pregnancy, and not vomiting that appeared to be associated with the onset of toxaemia. Distinguishing this qualitative difference in the pattern of vomiting, even though quantitatively there was no serious problem in either group, a significant difference was revealed between the two groups (Table 20).

TABLE 20.—VOMITING IN PREGNANCY

Rating	Early morning only	Throughout day
Toxaemic group (40)	23	17
Control group (34)	29	5
Chi-square = 6·77 $p < 0{\cdot}01$		

On the basis of this difference it is tempting to conclude that early-morning vomiting represents a normal, physiological symptom of pregnancy, whereas vomiting throughout the day is a psychologically determined symptom, related to the patient's disturbed attitude to her pregnancy and the coming child (a feature of the toxaemic group). Whatever the psychological implications, this pattern of vomiting does appear to have prognostic implications which may have a practical usefulness in assessing a patient in early pregnancy.

Heartburn in pregnancy. Common causes of heartburn are too rapid dilatation of the oesophagus during swallowing; reverse peristaltic waves starting from the stomach; psychogenic contraction of the cardia (TUMEN and COHEN, 1949). FAULKNER (1941), by direct oesophagoscopic examination, demonstrated that the oesophageal lumen can be narrowed or widened by the effect of emotions such as grief, anger, apprehension and fear. KROGER and FREED (1951) state that in their view heartburn in pregnancy results from a combination of oedema of the gut resulting from electrolyte changes, hormonal effects and autonomic nervous impulses. Psychodynamically, they found it commonly in women with latent guilt feelings over their rejection of pregnancy. In this series, heartburn was graded as mild or severe. The results are shown in Table 21.

Although the incidence of heartburn was practically the same for the two groups,

the severity differed significantly. If heartburn had occurred for the first time within fourteen days of the last normal antenatal record, it was excluded from this series, owing to the possible association with the toxaemic illness itself. In fact, severe heartburn would often occur many weeks before the onset of toxaemic signs, and

TABLE 21.—HEARTBURN IN PREGNANCY

Rating	Mild	Severe
Toxaemic group (30)	9	21
Control group (29)	27	2
Chi-square = 22·3 $p < 0.001$		

thus would appear to be an important prodromal symptom of toxaemia. The psychodynamics described by KROGER and FREED appear to be consistent with other findings in the toxaemic group, i.e. in regard to attitudes to pregnancy and the coming child.

Other common symptoms during pregnancy

The patients were questioned about other symptoms such as cravings, constipation, disturbance of appetite. There seemed to be no distinction between the two groups with regard to these symptoms. Bizarre cravings seemed uncommon; there was a common desire to eat more fresh fruit, there was the occasional oddity, such as the patient who could not get enough tomato sauce of a particular brand called "Daddy's"; a craving of some psychopathological interest. Another patient, who was clearly ambivalent about her pregnancy, had an intense desire to smell disinfectant, which she found "heavenly". Many reported an increased appetite—a feeling sometimes of having to eat enough for two.

PERSONALITY QUESTIONNAIRE

The patients were given the Maudsley Personality Inventory (MPI) to complete.

This is a new personality questionnaire developed by EYSENCK (1956) from the questionnaires of the Guilfords (1940) and from the Maudsley Medical Questionnaire (EYSENCK, 1947, 1952). The MPI was designed to measure two personality dimensions: neuroticism and extraversion–introversion. This latter concept was introduced by JUNG (1924), who pointed out that the characteristic neurosis of the extravert is hysteria, that of the introvert psychasthenia, but that extraversion–introversion is a characteristic of human personality, independent of neuroticism. EYSENCK (1947, 1952, 1953) has confirmed this, showing that neuroticism and extraversion–introversion exist as two independent orthogonal factors. Dysthymic patients, i.e. those suffering from anxiety states, obsessive-compulsive states, or neurotic depression, have a high introversion and a high neuroticism score; hysterics and psychopaths have a high extraversion and a high neuroticism score. Further, it has been shown that dysthymics and hysterics have a different capacity for acquiring conditioned reflexes (FRANKS, 1956). Dysthymics condition better than hysterics. This conditionability is related to extraversion–introversion and not to neuroticism. FRANKS and LAVERTY (1955) further showed that extroversion–introversion, as measured by the questionnaire and conditionability, was affected by sodium amytal; subjects under the influence of this drug became more extraverted and were conditioned less easily. This last observation is relevant to the present investigation, as most of the toxaemic group was sedated with amytal, this being part of the routine conservative treatment of pre-eclamptic toxaemia.

The MPI comprises forty-eight questions, the subject being asked to ring round "Yes," "No," or

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"?" in answer to each question. The neuroticism scale (*N*) and the extraversion–introversion scale (*E*) each comprised twenty-four of these questions. All items in the *N* scale have significant relation with Guilfords' *C* and *D* scales. The *C* scale indicates a cycloid disposition, strong emotional fluctuations, emotional instability. The *D* scale indicates depression, habitually gloomy mood, and pessimism with guilt feelings. All items in the *E* scale have significant relation with Guilfords' *R* scale, i.e. rhathymia, happy-go-lucky, carefree, lively, impulsive disposition.

Sex differences are small in the MPI, and the intercorrelations between the *N* and *E* scales are not significant. The split-half reliabilities of both scales are high. The test administered contained a lie score, i.e. twelve questions designed to test the degree of truthfulness and co-operation of the subject.

The results of applying *t* tests to the scores obtained by both groups are shown in Table 22.

TABLE 22

Test	Mean and S.D.		*t*	*p*
	Toxaemic group	Control group		
Neuroticism	12·2 ± 5·1	10·2 ± 5·1	2·07	0·05
Extraversion–introversion	11·5 ± 4·2	12·9 ± 4·2	1·55	between 0·1 and 0·2
Lie score	6·7 ± 3·3	6·8 ± 3·1	0·208	not significant

This shows the toxaemic group scored significantly higher on the neuroticism score; they tend to be more introverted, although this does not reach statistical significance. Sedation tends to make subjects more extraverted, and it is tempting to speculate whether this difference between the groups would have reached significance if the toxaemic group had not been sedated. The groups show remarkably little difference as far as the lie score is concerned, which indicates that there is little difference in the patient's attitudes to the test, as far as truthfulness and co-operation is concerned.

The neuroticism scores obtained from the MPI do represent an objective confirmation of the results of the interview where it was observed that patients in the toxaemic group complained of more psychiatric symptoms during their pregnancy than did patients in the control group.

BODY-BUILD

Opinions vary concerning the body-build characteristic of toxaemia. DIECKMANN (1952) writes: "I can find no type of body-build which favours the development of eclampsia". PAGE (1953) stated that a short, obese woman had an especial predisposition to toxaemia. VORZEIMER *et al.* (1933) studied various physical characteristics in a group of toxaemic woman as well as a control group. They found an increased incidence of abnormalities of stature, acromegaloid facies, higher pre-pregnant weight, and an abnormal distribution of pelvic types in the toxaemic group. They claimed to recognize endocrine stigmata in 98 per cent of toxaemic patients, compared with 15 per cent in the control group. DRAPER *et al.* (1944) described toxaemic patients as having a relatively heavy build (3·5 kg heavier than average). They had a wide gonal angle; deep chin; long facial length; narrow pelvis and shoulders of medium breadth; a long trunk, but narrow in the anterior-posterior diameter.

The following measurements were obtained from each subject in the present investigation:

(a) Height.

(b) Weight before pregnancy.

(c) Transverse chest diameter.

(d) Bi-acromial diameter.

(e) Bi-iliac diameter.

The weight before pregnancy was obtained from the patient, and was accepted if compatible with her first antenatal weighing, usually at three to four months. Where appropriate, these measurements were made as described by HRDRLICKA (1947). The discriminant androgyny score (TANNER, 1951, 1955) was calculated for each patient. This score is of great significance in this investigation, and will now be discussed at length. This account follows that of TANNER (1951, 1955).

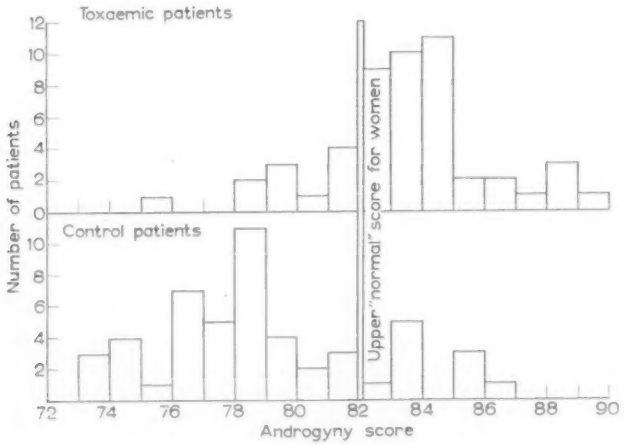

FIG. 1.—Androgyny scores for toxaemic and control patients.

The discriminant androgyny score is obtained from the following:

$$3 \times \text{bi-acromial} - 1 \times \text{bi-iliac diameter (in cm)}$$

In an investigation on Oxford students, TANNER obtained a score of $90{\cdot}1 \pm 4{\cdot}73$ for men and $78{\cdot}9 \pm 4{\cdot}57$ for women. The discriminant function gives the best discrimination between men and women using these two sets of data. Using 82 as the upper female limit, the Oxford investigation misclassified only 20 per cent of the women. Androgyny may be defined as the masculinity in women and the femininity in men. This score indicates that men are generally broad-shouldered and narrow-hipped, and women vice versa.

Taking a discriminant androgyny score of 82 as the upper limit for a normal feminine score, one finds that thirty-nine out of the toxaemic group of fifty come above this figure, and forty of the fifty controls fall below. This means that only twenty-one out of this hundred patients are misclassified, according to this score. Applying a *t* test to the scores for the two groups shows a very highly significant difference (see Table 23 and Fig. 1).

It may now be worth while discussing factors influencing this particular pattern of growth. According to TANNER (1955), it arises at puberty. Before this the discriminant function distinguishes the two sexes very poorly. This pattern of growth is thought to be directly due to the influence of the sex hormones. At puberty, the portion of the pelvis immediately medial to the acetabulum appears to push outwards. This is due to a great multiplication of the cells of the Y-shaped cartilage joining the

ilium, ischium, and pubis across the acetabulum; ossification centres appear in the cartilage shortly before puberty. In a similar way, the male response of increasing width of shoulders and chest represents a response to the male sex hormones of the cartilage in the coracoid and acromial processes of the scapula, the sternal end of the clavicle, and the heads and tubercles of the ribs, in all of which ossification centres appear at this time. The difference in the androgyny score in the present investigation, lies mainly in the bi-acromial diameter (where there is a very significant difference) rather than in the bi-iliac score, where there is no significant difference between the two groups (Table 23).

As will be seen from Table 23, weight and transverse chest diameter differed significantly between the two groups. The difference in the transverse chest diameter is in line with greater *B*-acromial diameter. The difference in weight was striking. Both these latter measurements, perhaps, again indicate the more masculine body-build of the toxaemic group.

TABLE 23.—SIGNIFICANCE OF PHYSICAL MEASUREMENTS AS SHOWN BY THE *t* TEST

Test	Mean and S.D.		*t*	*p*
	Toxaemic group	Control group		
Bi-acromial diameter (cm)	37·5 ± 1·1	35·9 ± 1·2	7·16	0·001
Bi-iliac diameter (cm)	28·7 ± 1·4	28·9 ± 1·6	0·68	not signif.
Androgyny score	83·4 ± 2·7	78·9 ± 3·3	7·62	0·001
Transverse chest diameter (cm)	30·2 ± 1·9	26·2 ± 1·0	5·24	0·001
Height (cm)	162·3 ± 5·1	160 ± 4·8	1·71	not signif.
Weight (kg)	62·6 ± 8·5	56·6 ± 8·0	3·74	0·01

The rating with regard to sex, to the emotional reaction to the menarche, to pre-menstrual tension, and to the coming baby indicate that the toxaemic group has had difficulty in adjusting to such essentially feminine phenomena as sex and menstruation, and to their existing pregnancy. It is perhaps possible to relate this psychological difficulty in adjustment to the feminine role with the atypically feminine body-build of the toxaemic group.

To evaluate the association between body-build and sexual activity for all the subjects, toxaemic and controls, it was decided to compare women whose androgyny score was 82 or above with those women whose androgyny score was below 82. Those whose rating, for this factor, was 1 or 2, were grouped as "normal"; those whose rating was 3, 4, or 5 were classified as "frigid." The results of this comparison are shown in Table 24.

TABLE 24.—BODY-BUILD AND SEXUAL ADJUSTMENT

Sexual rating	Normal	Frigid
Androgyny score 82 or over (49)	16	33
Androgyny score under 82 (51)	28	23
Chi-square = 5·1 $p < 0.05$		

Similarly, the relation between body-build and reaction to the menarche is shown in Table 25.

These results suggest that sexual and menarchal difficulties are associated, in this group of subjects at any rate, with an atypically feminine body-build. The results are especially striking when one considers that the sexual rating was made on marital

TABLE 25.—BODY-BUILD AND REACTION TO THE MENARCHE

Rating for reaction at menarche	0	1	2	3	4
Androgyny score 82 or over (49)	19	6	10	9	5
Androgyny score under 82 (51)	31	9	7	3	1

Chi-square = 9·6 $p < 0.05$

sexual adjustment only and that many factors, independent of body-build and sexual potentialities, must play a part in the sexual rating of these subjects. For example, a husband with sexual difficulties of his own, would almost certainly cause a woman to be rated lower than she would have been with a sexually normal husband.

What the causal relationships are in this association, it is hard to say. It is probable that an inherited constitutional anomaly would be reflected at the psychological level in this difficulty with feminine activities. However, it may be possible that psychological difficulties, i.e. a traumatic menarche, could, to some degree, affect body development.

There is considerable evidence, for example, that all lobes of the pituitary gland (and through it, the gonads) are under neural influence (HARRIS, 1946). HUBBLE (1952) states there is some clinical evidence that the growth hormone may be affected by emotional factors. BAIRD (1955) discusses some of the factors responsible for the varying types of female pelvis and concludes that economic and environmental factors are important. BERRY and COWIN (1954), in a study of factors responsible for physical development in boys, found a significant relationship between quality of parental care, and weight, irrespective of dietary levels. WIDDOWSON (1951) found a similar relationship in the effect of a "motherly" matron on the orphans in her care.

With regard to this, it is difficult to assess the significance of the toxaemic groups disturbed family relationships. These may be merely the result of the patient's abnormal personality, or may derive from early emotional difficulties in the family which also produced the patient's abnormal personality. Animal experiments with gentling, i.e. stroking and petting, are of some interest in this connexion. For example, WEININGER (1954) showed that gentled rats grew strikingly larger and survived prolonged starvation better than non-gentled rats.

Causal relationships are always complicated in such a problem as this, as parents endow their children not only with their constitution, but also determine the type of environment in which the children are to be brought up. In this case, the atypical "masculine" mother may adversely affect the psychosexual development of her daughter, thus reinforcing and exacerbating any constitutional anomaly which the daughter may have inherited.

DISCUSSION AND CONCLUSIONS

The toxaemic patients have shown difficulty at every stage of their feminine development: at the menarche, with menstruation, with sexual intercourse, in their

attitude to pregnancy, and, finally they have developed toxaemia with their first pregnancy. A considerable number seemed to be affected by environmental difficulties, and in many cases, possibly, these factors determined the occurrence of toxaemia. However, there appears to be a possible relationship between environmental stress and personality factors. Under the rating for housing it was pointed out that personality had some bearing on obtaining satisfactory housing accommodation, but in other spheres, too, it can be appreciated that the woman whose real interest is not in child-bearing would select her husband and arrange her life differently from her more feminine sister, and so be at a disadvantage environmentally, with the onset of pregnancy. In some cases, where the woman appeared to have made a good previous feminine adjustment, and was of normal physique, it was tempting to relate, causally, environmental stress and the onset of toxaemia.

Such a case was an unmarried mother of 20 who had been living fairly happily with her lover, a deserter from the Army. She had a history of good sexual adjustment, no disturbance at the menarche, and no pre-menstrual tension. However, two weeks before the onset of toxaemia her lover was arrested by the Military Police, and as she was not an official relative, she was not advised as to where he had been taken.

It seems that the threshold concept is of some help in appreciating the part played by these factors. Once the threshold is lowered beyond a certain point, signs of toxaemia will appear. Personality factors and atypical physique will represent a low threshold, which may be further diminished by environmental stress. Other factors not dealt with in this investigation may also lower this threshold, e.g. primaparity, multiple pregnancy, diabetes, and essential hypertension.

If the pathogenesis of pre-eclamptic toxaemia were known, it would be profitable at this stage to discuss the mechanism of these psychosomatic factors. As, in spite of numerous theories, the pathogenesis is unknown, it is fruitless to consider this at length. Suffice it to say there is considerable literature on the effect of neural factors on the pituitary (HARRIS, 1946), on renal blood-flow (WOLF *et al.*, 1949), urinary volume and electrolyte excretion (SCHOTTSTAEDT *et al.*, 1956), and other physiological activities which may be important in the pathogenesis of this disease.

In medicine it seems that the question of cause and effect is becoming increasingly complex. Even in the common infections it is clear that the "cause" of a patient developing, say, meningococcal meningitis, often lies as much with the patient's resistance as it does with the meningococcus. Practically, however, the meningococcus provides the point of useful intervention, i.e. with chemotherapy, and the patient recovers. It would seem, therefore, that the final consideration of this paper should not be whether psychosomatic factors "cause" toxaemia, but whether these factors do provide any point of useful intervention when dealing with a specific patient.

Consideration of these psychosomatic factors in an individual patient appears to have a considerable prognostic value in early pregnancy. The androgyny factor alone only misclassified twenty-one out of the one hundred patients seen in this series. If it is thus possible to select the women who are liable to develop toxaemia, early prophylactic treatment may be instituted before the onset of signs, by pharmocological, dietary, or psychotherapeutic means. Indeed, if these observations on the psychosomatic factors in toxaemia are valid, toxaemia would appear to be an ideal testing ground for the value of psychotherapy in psychosomatic illness.

SUMMARY

A group of fifty primiparae suffering from pre-eclamptic toxaemia was compared with a control group of patients from the antenatal clinic. They were matched for age, parity, and time in pregnancy seen. They were interviewed and rated on a five-point scale on seventeen items. At the same time a number of anthropometric measurements were taken. The toxaemic group differed significantly from the control group on the following points:

(a) *Personality factors*

The toxaemic group showed an increased incidence of:

(1) Emotionally disturbed menarche,
(2) Pre-menstrual tension,
(3) Poor sexual adjustment,
(4) Disturbed attitude to pregnancy, accompanied by
(5) Psychiatric symptoms during pregnancy,
(6) High neuroticism score on the Maudsley Personality Inventory.

(b) *Physique*

(1) Abnormal discriminant androgyny score (3 × bi-acromial — 1 × bi-iliac diameter),
(2) Increased transverse chest diameter,
(3) The toxaemic group's pre-pregnant weight was greater.

(c) The toxaemic group had an increased incidence of emotionally disturbing events during pregnancy.

(d) The toxaemic group had increased incidence of emotional disturbances associated with their family.

(e) The toxaemic group had increased incidence of severe heartburn.

(f) The two groups had nearly the same incidence of vomiting, but in the toxaemic group this was characterized by occurring more often throughout the day as opposed to early-morning vomiting.

It was found that the woman who develops toxaemia has shown evidence of poor adjustment to the feminine role psychologically, as shown by her reaction to the menarche, pre-menstrual tension, poor sexual adjustment, disturbed attitude to pregnancy, and psychiatric symptoms in pregnancy. Physically, her abnormal androgyny score deviated towards the masculine.

The findings indicate that a consideration of these psychological and physical factors should enable a useful, early prognostication of those patients liable to develop pre-eclamptic toxaemia, and hence lead the way to early prophylactic treatment.

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APPENDIX

Items rated on the interview

Relationship to mother.
Relationship to father.
Relationships to siblings.
Neurotic traits as a child.
Attitude towards school.
Attitude towards work.
Attitude towards menarche.
Dysmenorrhoea.
Pre-menstrual tension.
Attitude towards feminine role.
Attitude towards sex.
Marital state.
Attitude towards child.
Psychiatric symptoms before pregnancy.
Psychiatric symptoms during pregnancy.
Housing difficulties.
Emotional disturbances during pregnancy.

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EFFECT OF STRESS AND GENTLING ON HAIR LOSS DUE TO EPIDERMAL CARCINOGEN PAINTING*

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IN a previous paper the authors presented the results of two experiments which demonstrated that stress introduced in addition to epidermal painting of methyl cholanthrene affected speed of hair loss development in experimental animals (WINOKUR *et al.*, 1957). Painting of a cancer susceptible mouse with methylcholanthrene ordinarily produces epilation in the painted area. When comparison is made between stressed animals and controls the hair loss is retarded in the former. Inhibition of a pathological process by stress is consistent with the work of RASHKIS who found that systemic stress, i.e. forced swimming, inhibited for a period of time the development of both ascites tumors and methylcholanthrene induced tumors (RASHKIS, 1952). However it is opposed to a finding such as KHALETSKAIA's that a weak electric current (an unconditioned stimulus) encouraged appearance of skin tumors in mice and that a conditioned stimulus in the form of sound reinforced by "tactile-painful stimulation" produced analogous effects (KHALETSKAIA, 1954). The reason for these divergent findings has not been accounted for, but the present experiment gives some idea of how another variable, namely that of gentling, handling or taming might influence the development of a pathological process. It also provides some notion of how stress and gentling or taming interact in their influence on such a pathological situation. (These two terms, gentling and taming are used interchangeably in this paper.)

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PROCEDURE

Sixty-one female CAF_1 mice 35–40 days old upon receipt from the Roscoe B. Jackson Laboratories were the subjects of this study. Five days after receipt of animals, they were randomly assigned to three experimental groups. Group A (gentled-shock, $N = 20$) was subjected to a series of daily electric shocks for fifteen days prior to painting, with shocking schedule maintained throughout the period of painting. Group B (gentled only, $N = 20$) was not subjected to the shocking schedule, but otherwise treated identically to group A. Group C (non-gentled, $N = 21$) were minimally handled and like group B, subjected to the painting schedule.

The gentling procedures to which groups A and B were subjected consisted of daily handling (six out of seven days per week) for the forty-six days prior to first administration of grid shock to group A. Gentling consisted of carefully and gently removing animals from their living cages, transporting them to the room in which they were weighed, placing them into the weighing pans, weighing them and then equally gently returning them to their living cages. These animals were thus handled four times a day as part of the routine weighing procedure.

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"Non-gentled" animals were kept in their home cages and were removed from them once a week for weighing of animals and cleaning of cages. These animals were only handled twice during this procedure, i.e. placement into and removal from the weighing pan. When handled they were treated identically to the gentled groups.

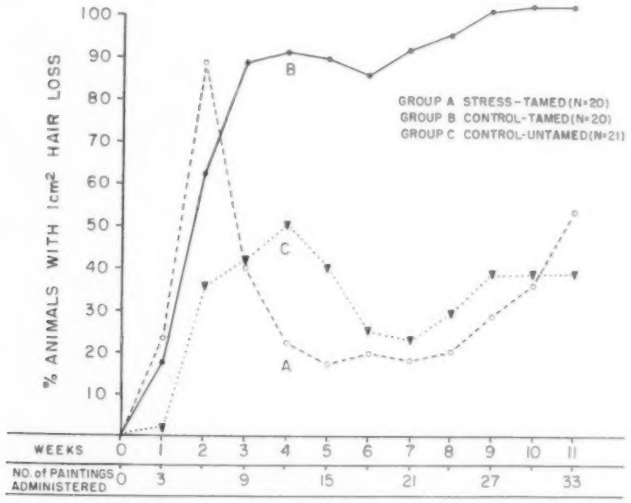

FIG. 1.—Percentage of animals in each group showing 1 cm² hair loss after painting with methylcholanthrene.

Forty-six days after start of gentling group A was started on the stress schedule. The stress consisted of energizing the cage floor with a current varying in intensity between 0·4–1·0 mA. Current value was determined by responses of the animals to the electric current. Such responses as squeaking, running, jumping, and production of mucous streaked stools, determined whether shock should be increased. Animals were shocked on an aperiodic schedule, receiving 5–10 shocks per day spaced over an 8 hr interval. Each shock lasted 2 sec. Shocks were administered manually so that animals' responses could be observed.

Fifteen days later, or sixty-one days after start of gentling procedure, painting with a 0·6 per cent solution of methylcholanthrene dissolved in pure benzene was initiated for all three groups. The solution was applied to the animals' back with a No. 4 camel hair brush. Forty applications at the rate of three per week were made with alternate paintings from neck to tail and tail to neck. Animals were not shaved or clipped prior to painting.

In previous experiments, the technique for hair loss evaluation used in the present study had been developed. Animals were classified into two groups; those showing maximal hair loss (a patch of bare skin larger than 1 cm²), vs. those showing minimal or no hair loss. These evaluations were made for the first eleven weeks of painting.

RESULTS

The results of this evaluation are depicted in Fig. 1.

It will be seen that the variable of taming vs. non-taming was potent in determining whether or not large areas of hair loss as a function of methylcholanthrene application

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developed. In the group of tamed animals (Group B) there was a steady increase in the number of animals exhibiting large areas of hair loss, so that after nine paintings 90 per cent of animals exhibit such hair loss. After thirty paintings all these animals could be classified under the maximal hair loss category. The untamed animals (Group C), on the other hand, showed considerable resistance to this phenomenon, and at no time during the period of observation did more that 50 per cent of them show such hair loss.

The hair loss of stress tamed animals (Group A) followed a different course. This group showed a maximum hair loss before it was seen in the tamed animals, with a quick regeneration of hair. Throughout the subsequent course of the experiment these animals did not reach the level of hair loss shown by the control-tamed animals.

A chi square analysis comparing hair loss between the various groups is presented in Table 1. Analyses for paintings 15–33 were carried out individually, but are indicated

TABLE. 1.—COMPARISON BETWEEN GROUPS OF NUMBER OF ANIMALS EXHIBITING LARGE HAIR LOSS AREAS

No. of paintings	Stress-tamed vs. tamed (A–B)	Tamed vs. untamed (B–C)	Stress-tamed vs. untamed (A–C)
0	N.S.	N.S.	N.S.
3	N.S.	N.S.	N.S.
6	N.S.	0·01	0·01
9	*0·01	0·01	N.S.
12	0·01	0·05	N.S.
15–33	0·01	0·01	N.S.

* P.—equal to or beyond the 0·01 level of confidence

in one line on the Table since the same level of significance persisted throughout the entire period of hair loss evaluation.

DISCUSSION

The results of this experiment indicate that a number of variables may enter into and affect the speed of development of hair loss incident to the application of methylcholanthrene. In the earlier studies, referred to above, analogous results were observed. In these previous studies, however, no attempt was made to investigate the variable of taming. The stresses used were enforced activity and a conditioning experiment involving grid shock. The stressed animals exhibited hair loss development which was less severe as well as slower than that shown by control animals.

The results are of interest on two grounds. The first is in suggesting that, under certain circumstances, a given "stress" is not necessarily harmful, since in these experiments the "stress" reduced the degree of what might ordinarily be considered a sign of disease, i.e. hair loss (Group B vs. Group A). There is, moreover, no special reason to think that all so called "stresses" must have substantially the same effects on animals exposed to them.

It is possible that the differences in hair loss were a function of alterations in the

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hair growth cycle produced by stressing or taming. It is known that susceptibility to methylcholanthrene varies with different phases of the cycle (CHASE and MONTAGNA, 1951; CHASE, 1954; SUNTZEFF *et al.*, 1955). Since all animals were of approximately the same age it is highly unlikely that the differences found were the result of differences in the hair growth cycle at the start of the experiment. The random assignment of animals to the three groups makes such an explanation even more improbable.

In the present experiment the effect of "gentling" vs. "non-gentling" was readily observable in the animals' response to handling. Animals in the gentled groups were easily picked out of their cages and would quietly sit in experimenter's hand. "Non-gentled" animals on the other hand, were quite skittish and tried to escape being picked out of their cages. These behavioural differences became easily observable after a month of daily handling of the gentled animals.

Second, it would also appear that gentling is of importance in modifying not only the behaviour of animals but also in altering the response of organisms to carcinogens (Group B vs. Group C), and it may possibly turn out that carcinogenesis itself is similarly influenced. If so, apparently conflicting results of others may be explicable on the basis of uncontrolled or unreported differences in the amount of gentling. It is of interest to note that WEININGER found that gentling at an early age in the albino rat was associated with relative immunity to stress damage (WEININGER, 1954, 1956).

Our experiments, however, are not exactly analogous to those of WEININGER, as both stress and gentling continued for a prolonged period of time whereas WEININGER gentled the animals and then exposed them to only acute stresses. However, both experiments indicate that there is interaction between two stimuli on an organismic variable. One member of this *regulative dichotomy* is the presence of stress with no gentling, and the other member, gentling with no stress. Whether either gentling or stress can be titrated as far as amount and effect is concerned cannot be answered by these data.

From Fig. 1 it will be noted that Group A (stress-tamed) had a large amount of hair loss by the second week and appeared at first similar to the unstressed, control tamed Group B. This result may either be an artefact or may suggest that gentling when applied concurrently with stress affects the animal more quickly than stress but soon becomes relatively impotent to alter changes which occur as a function of stress. Chronicity of exposure to stress then, rendered the effects of gentling of relatively little importance in this experiment.

In the case of the control-untamed animals (Group C) we feel that the animals are "stressed" when they are painted or evaluated for hair loss. Stress then, in this experiment is able to slow down the speed of hair loss seen in animals subjected to methylcholanthrene painting.

SUMMARY

When methylcholanthrene was applied to unepilated mouse skin, gentled (tamed) animals showed greater hair loss than non-gentled (untamed) or stressed (electrically shocked) animals.

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PROGNOSTIC VALUE OF ADRENALINE AND MECHOLYL RESPONSES IN ELECTROCONVULSIVE THERAPY*—II

R. Bruce Sloane, M.D.,† David J. Lewis, M.D.,‡ and Patrick Slater, M.A.§

We recently reported that patients who showed less disturbance of blood pressure in response to intravenous adrenaline and intramuscular Mecholyl given on the same day had a somewhat better outcome following E.C.T. than those who showed wider variations. These findings were the opposite of previous workers. (Funkenstein *et al.*, 1952 b).

Concomitant studies, however, revealed that this one-day method of administering the drugs was less reliable than where adrenaline and Mecholyl were given on separate days (Sloane, Lewis and Slater, to be published). We therefore analysed thirty-one cases done by this latter technique in terms of eleven measurements derived from the curve of blood-pressure response (see Table 1), to distinguish improved from unimproved subjects.

Table 1

Variable No.	Description	Units
1	Basal blood pressure; mean of last five readings within a range of 8	mm Hg
2	Initial blood-pressure reading on commencing test	mm Hg
3	Differences between initial reading and basal (Variable 2–Variable 1)	mm Hg
4	Maximal height of adrenaline rise above basal	mm Hg
5	Time for pressure to return to basal after adrenaline	minutes
6	Maximal fall after Mecholyl	mm Hg
7	Time to post-Mecholyl homeostasis*	minutes
8	Area† of fall to Mecholyl before homeostasis	area units
9	Total area of fall to Mecholyl	area units
10	Total area rise to Mecholyl	area units
11	Maximal rise to Mecholyl	mm Hg

* Homeostasis was defined as the point at which the blood pressure returned to the basal level, or within 4 mm of mercury of the basal level after the initial fall, and remained there for three consecutive min. If the blood pressure remained at the basal level for 4 min, with one reading outside the range, it was also scored as homeostasis in our series.

† Area was derived by plotting the Mecholyl curve on graph paper with the vertical side of each square representing 6 mm mercury and the horizontal 1 min of time.

METHOD AND MATERIAL

The technique of testing has been reported (Sloane and Lewis, 1956). There were fourteen males and seventeen females equally distributed between improved

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and unimproved groups, with a mean age of 41 years, ranging from 22 to 59. Their diagnoses are shown in Table 2.

TABLE 2

Diagnoses	Improved	Unimproved
Depressives	7	14
Involutionals	1	1
Schizophrenics	2	0
Neurotics	2	3
Schizoaffectives	1	0
	13	18

RESULTS

The means of variables 1, 2, 3, 4, and 5, concerned with resting blood pressure and adrenaline rise, and variables 10 and 11 expressing compensatory rise to Mecholyl, showed no significant differences between improved and unimproved subjects. However, variables 6, 7, 8, and 9, expressing the Mecholyl fall, all showed significant differences, and these, together with the *F* ratios and *P* values derived from an analysis of variance are shown in Table 3. The improved had a smaller and briefer fall.

TABLE 3

Variable	Description of variable	Number of cases		Means		*F* ratio	*P* value less than
		Unimp.	Impr.	Unimp.	Impr.		
6	Maximal fall after Mecholyl	18	13	22·6	13·2	7·3	0·05
7	Time to post-Mecholyl homeostasis	18	13	14·3	7·4	6·2	0·05
8	Area of fall to Mecholyl before homeostasis	18	13	22·6	9·6	6·3	0·05
9	Total area of fall to Mecholyl	18	13	26·9	11·4	6·3	0·05

The four discriminatory measures are too closely related to have much additive value. Variable 6 used by itself can reduce errors of estimation by 20 per cent; but the optimum combination of eight variables (4 to 11) only provides another 5 per cent reduction.

DISCUSSION

We suggested in our earlier paper that the less the disturbance of homeostasis and the quicker its restoration, the better the prognosis of the patients. Broadly, this was confirmed by these measurements, although it appeared that fall of blood pressure was a more sensitive indicator than rise, whether induced by adrenaline or Mecholyl. This seemed more in favour of the simple explanation that the autonomic balance of these patients was closer to the normal than the postulate that Mecholyl served as an indicator of hypothalamic responsivity (GELLHORN,

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1953). Whether hypothalamic reflex arcs play a significant role in the restoration of blood pressure in man following peripheral vasodilatation remains controversial. Still more unproven is the postulate that hypothalamic imbalance can be causally invoked in either manic-depressive psychosis or schizophrenia. If the predictive value of this test were dependent upon hypothalamic function, it might have been expected that the phase of compensatory rise of pressure would have differentiated the two groups. However, we have shown that a small group of schizophrenics were, in fact, distinguished from both neurotics and depressives by the extent of this secondary rise (SLOANE, LEWIS and SLATER, to be published).

In conclusion, we would still remain cautious in our interpretation of these results until they are confirmed. The sample was small and there were a relatively high proportion of unproved cases.

However, these data would indicate that, like many another "prognostic test," the more the patient approximates to the norm, whether judged by psychological or physiological criteria, the more likely is he to improve with treatment. Nevertheless, a test with a predictive value of not more than 25 per cent above chance would not appear an adequate substitute for sound clinical judgment.

SUMMARY

A group of thirty-one patients of mixed diagnoses but with predominating depression, were tested with adrenaline and Mecholyl before E.C.T. Those who improved were compared to those who did not by mathematical measurements derived from the blood-pressure responses to the two drugs. The improved had a significantly ($P = 0{\cdot}05$) smaller and briefer drop of blood pressure to Mecholyl than those who did not. Neither the primary rise of pressure to adrenaline nor the secondary, compensatory, rise to Mecholyl showed significant prognostic correlations.

These findings indicated that the more stable and close to the normal the blood-pressure responses of psychiatric patients were, the better their outcome with E.C.T. However, the practical clinical value of such a test remained doubtful.

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THE EVALUATION OF "MEDICAL" THERAPY IN ESSENTIAL HYPERTENSION

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Therapy of any variety is notoriously difficult to evaluate in chronic diseases, but it is unusually complicated in disorders such as essential hypertension which constitute the psychobiological expressions of multiple aetiologic vectors. Critical review of the available evidence, (Glock and Lennard, 1957; Hambling, 1952) suggests that hypertension is a disease peculiarly responsive to social and emotional influences, although the relationships of these factors to the genetic substrate, to early interpersonal experiences, to the formation of predisposing unconscious conflicts, and to the precipitation and maintenance of the hypertensive state are largely unknown. Present knowledge, however, is sufficient to require some identification and consideration of these emotional and social influences in the experimental design of an adequately controlled study of "medical" treatment for patients with essential hypertension.

The present study was an attempt to use the insights provided by sociology and psychiatry in the design of a clinical evaluation of the hypotensive effects of certain therapeutic regimens. It was not concerned with "the aetiology" of essential hypertension, except to the extent that patients with known or demonstrable organic causes of hypertension were not knowingly included in the series. Nor was the study concerned with evaluating the effects of therapy on the natural history of essential hypertension and its associated vascular changes. Finally, it was not concerned with determining whether a particular form of therapy would lower blood pressure over a period of many months and years, although in a follow-up study, data have been accumulated in this area which will be presented elsewhere.

It has been observed frequently that pressures recorded at home by well-instructed patients are lower than those taken in the physician's office (Ayman and Goldshine, 1940). Repeated values obtained for the same observer are often lower at the end of a test period than at the beginning. The conscious or unconscious bias of the physician for the drug which he prescribes is a factor of great importance in patient response, but only one of many elements in the overall effect of the patient-physician relationship (Goldring *et al.*, 1956; Hill, 1952; Reiser *et al.*, 1951; Shapiro *et al.*, 1954). Ayman (1931) and Ferris (1951) emphasized the erroneous conclusions regarding reduction of blood pressure in essential hypertension which may occur when the significance of these situational and emotional factors is not appreciated. Ayman (1931) concluded that "everything that affects the patient's environment, body and mind must be observed and controlled as much as possible when one is evaluating the results of attempts to lower the blood pressure".

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Other sources of difficulty in interpreting results of treatment lie in failure to define clearly the term "hypertensive patient," and failure to classify patients according to the severity of associated organ damage as well as by the height of the blood pressure. Many studies have combined elderly patients whose elevations may be due largely to the vascular changes of ageing and very young hypertensives whose elevations are usually secondary to primary renal disease. It is not unusual to find obese, middle-aged women with no evidence of vascular disease included in the same group with men who have retinal exudates and haemorrhages. It is difficult to draw valid conclusions from studies of such heterogeneous groups of patients.

The present paper discusses problems related to the construction, execution and adequacy of this study as an instrument for evaluating hypotensive regimens.

SELECTION OF PATIENTS

Sixteen white out-patients between 32 and 55 years of age were studied, both the mean and median ages were 43 years. These age limits were selected to include the period in which essential hypertension most commonly occurs in adults and to exclude those elderly patients with hypertension primarily on an arteriosclerotic basis. There were 9 men and 7 women; all patients were married.

Each patient gave reasonable assurance of willingness and ability to make weekly visits to the Clinic over a 32 week period. Casual, resting, recumbent blood pressure readings consistently above 160/100 during a preliminary observation period of several weeks or longer in the clinic or hospital were required. The majority of patients had pressures in excess of 200/110.

A complete medical history and physical examination were followed by diagnostic studies which included: haemoglobin, white count, urinalysis, urine culture (a catheterized specimen from females and a clean-voided mid-stream specimen from males), BUN, PSP excretion, intravenous pyelogram, chest X-ray, electrocardiogram, and funduscopic examination by an ophthalmologist. A 20 hr urine concentration test was done and pheochromocytoma was tested for by intravenous administration of phentolamine, 5 mg.

Definite evidence of organ damage secondary to the essential hypertension was required, although patients with azotemia, papilledema or severe heart failure were excluded. The evaluation of past symptoms suggesting antecedent urinary tract infection proved very difficult. Three patients had such histories, one of whom had had a renal calculus removed. One additional patient also had had a renal calculus. Several patients had urine cultures which grew organisms considered to be non-pathogenic. After careful evaluation of all the data, it was concluded that none of the patients had chronic pyelonephritis. The difficulties in making these judgements should not be underestimated, however, and subsequent events proved this conclusion erroneous in at least one patient (O.T.).

With the possible exceptions noted, and within the limits of the diagnostic methods employed, none of the patients had any evidence that the hypertension was other than "essential" in variety and none had other significant complicating diseases. In each patient the test for pheochromocytoma was negative and none of the intravenous pyelograms showed any anatomical abnormalities.

DESIGN OF THE CLINICAL TRIAL

Four regimens were to be evaluated: a placebo, phenobarbital, reserpine alone, and reserpine combined with hydralazine. It was desired to determine which, if any, of the four drug regimens had hypotensive properties beyond those associated with the investigative programme itself and the influences of other unmeasurable factors. It seemed essential, therefore, to incorporate into the experimental design a recognition of certain broad psychological and social influences.

The following features of the design warrant comment:

(1) The distribution of patients between treatment regimens was done by the biostatistician who did not see the patients and knew nothing about them. It seemed clear from early conversations that a distribution to treatment regimens by any of

the clinical investigators might have been seriously distorted by conscious or unconscious wishes for specific patients to be given what were thought to be the "most potent" regimens. Bias could readily have crept in, although it had been agreed previously that no patient would be selected for the study whose management would in any way be jeopardized by treatment with any one of the four regimens. This random distribution among treatments could scarcely have been conducted impartially by persons familiar with the patients.

(2) Once selected for the study, it was considered important for the physician directly responsible for patient care to be familiar with each patient's medical and personal history, to be aware of the major areas of psychological and inter-personal conflict and to have some knowledge of the patient's current life situations. Accordingly, an interview lasting sixty to ninety minutes was conducted with each patient by one of us (K. L. W.) with one of the other investigators (J. D. D.) in attendance. Although these interviews revealed the great importance of emotional and social factors in the lives of the patients and suggested their possible influence on the natural history of hypertension, no attempt was made to evaluate their aetiologic significance. The interviews did acquaint the investigators with the patients and demonstrated in a rather positive manner the personal interest of the team in each patient.

(3) Because of the strong influence of the patient–physician relationship on the course of the hypotensive response, the same physician saw all patients on practically all visits, except for occasional absences when one of the other two medical investigators also known to the patients saw them. A weekly evaluation of the attitudes and feelings of the physician towards each patient was attempted, but this proved impractical because of the subjective nature of his comments and the minimal variations occurring from week to week. The physician did observe differences in his predominant conscious feelings toward the various patients, but it was not apparent from the data available that these had any consistent long-term effects on the blood pressure determinations in terms of the over-all responses to the treatment regimens. The influence of short-term responses had been eliminated insofar as the physician was concerned by having the blood pressure taken before the patients saw him on each weekly visit.

(4) All blood pressure readings were taken by the nursing supervisor of the Clinic (J. W.) except for a few occasions when a similarly instructed nurse took them. After an initial ten minute rest period, three recumbent blood presssures taken in the same arm at two minute intervals were averaged to obtain the reading for each visit. The nurse also recorded comments and symptoms which the patients were encouraged to volunteer. The continuity of the patient–nurse relationship was considered of great importance and certain revealing observations discussed below were made by the nurse.

(5) Knowledge of the blood pressure levels was withheld from both the patients and the physician responsible for the patients. It was believed that knowledge of the blood pressure by either the physician or patients might significantly alter responses to the treatment regimens. The physician was only told about the variations in the blood pressure levels at the end of each patient's period of study.

(6) Because of the influence which knowledge of the treatment regimen might have upon the physician's attitude towards the patient's symptoms and management,

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the double-blind technique was employed. Neither the physician caring for the patients, the nurse nor the patients themselves knew what drugs were being employed or the plan of the study.

(7) The social environment in which patients live is accorded varying degrees of importance by different authors (ALEXANDER, 1939; BAYS and SCRIMSHAW, 1953; REEDER, 1956; REISER *et al.*, 1951), and although the precise significance of "social stress" with respect to the onset and course of essential hypertension is unknown, it was considered advisable to attempt some objective evaluation of the relative degree of "stress" experienced by each patient. Accordingly, a series of "social stress" indices were employed. No claim is made that these indices measure any influence which is causally related to the hypertension but they do appear to distinguish the patients in accordance with the varying degrees of social pressure they are experiencing. Prepared questionnaires and interviews in both the Clinic and the patients' homes were used to collect socio-environmental data by the Sociology Research Assistant. In order that adequate data for the social stress indices could be obtained, it was a requirement of the study that all patients be married and living with their spouses. Data was collected which permitted ranking of the patients in accordance with the stresses they were experiencing in two areas (appendix A).

(a) Situational pressures arising from space-crowding complicated by disturbance potentials of children within certain defined destructive ages (BOSSARD, 1951).

(b) Value conflicts with respect to marital and family issues between patient and spouse, derived from a value inventory administered to spouses independently making possible three reflections of value conflict:

(i) actual value disagreement between spouses;

(ii) projective disagreements, privately defined differences between patient and spouse defined by the patient, and between patient and spouse defined by the spouse;

(iii) misperception scores, obtained by noting discrepancies between spouses, actual answers and their projected answers (KIRKPATRICK and HOBART, 1954).

From the composite scores, the sixteen patients were grouped into three categories of relative social stress: high, middle, and low-middle.

(8) The sixteen patients were distributed among four groups of four so that the patients in each group had approximately similar blood pressures and social stress ratings (appendix B). Once the assignments were made to groups, the patients within each were assigned to treatments at random by the biostatistician who knew the treatments only by the letters *A*, *B*, *C* and *D*. This method amounted essentially to a random distribution among treatments with the factors of level of blood pressure and social stress taken into consideration.

(9) All patients were given placebo during the first 8 weeks, then 16 weeks of the assigned treatment and a final 8 weeks of placebo. Drugs were dispensed in capsules identical in appearance and taste. One capsule was taken four times daily and 8 days' supply was provided at each visit. The bottles were returned at the next visit and any capsules not taken noted. Phenobarbital capsules contained 30 mg of the drug. Reserpine was given in 0·25 mg capsules. Hydralazine capsules, each combined with 0·25 mg of reserpine, were prepared in three strengths: 25 mg, 50 mg and 100 mg. Patients receiving hydralazine were given weekly increments in dosage to the maximum daily dosage of 400 mg.

(10) At each visit a brief physical examination was made by the physician and symptoms were inquired about according to a standard check list which emphasized items related to the cardiovascular and renal systems and possible side effects of drugs. An attempt was made to quantitate the severity of symptoms and to assess whether they were due to organic disease, emotional factors or the drug treatment.

RESULTS

The results are graphically summarized in Figs. 1 and 2, and the details of the blood pressure readings and the calculations used to determine the significance of the changes are published elsewhere (Dorsett *et al.*). Since the four groups of patients were approximately balanced through

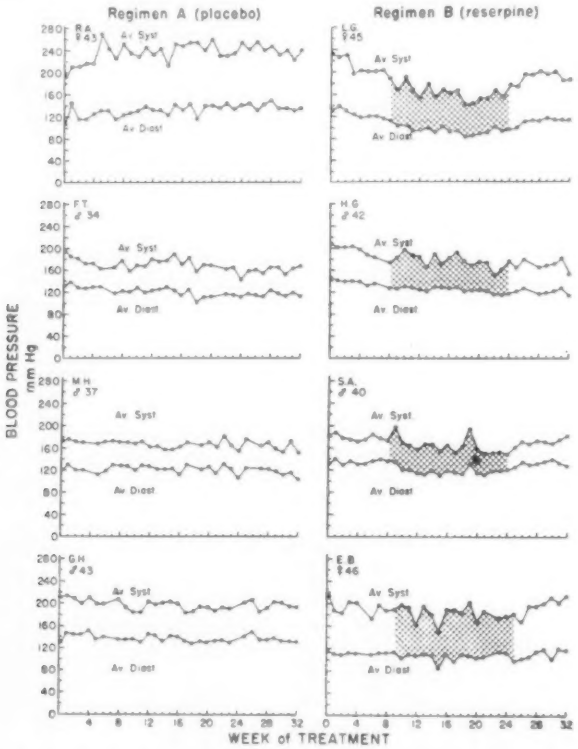

Fig. 1.—Individual blood pressure graphs for patients receiving regimen A and regimen B. Regimen A consisted of placebo only for 32 weeks. Regimen B consisted of 8 weeks of placebo, 16 weeks of reserpine (cross hatched area), and 8 weeks of placebo. The first measurements in each graph were taken under standard conditions prior to starting placebo therapy. Each value plotted is the average of three recumbent measurements.

their assignment as described above, a comparison may be made between the treatments as well as between the three periods of each patient's regimen. Only one drug regimen, i.e. reserpine-hydralazine, was found to lower blood pressure significantly.

Certain other less tangible, but perhaps equally important results deserve comment:

(1) There was considerable variation both in weekly blood pressure readings and in trends during the initial control placebo periods in association with participation in the study.

(2) In all twelve patients who did not receive resperine-hydralazine, there was a tendency for the blood pressure of the individual patients to maintain the same trend throughout the 32 weeks

of the study. Four of these patients had an upward trend, 5 were relatively stable, and 3 were downward. The levels of blood pressure for individual patients varied from time to time, but the trends altered very little.

(3) There did not appear to be any correlation between the various degrees of social stress as measured by the indices employed and either diastolic or systolic blood pressure levels; nor were there any apparent relationships between these indices and the responses to the different treatment regimens.

(4) During the final control placebo periods, patients under reserpine and reserpine-hydralazine tended to have a rise in blood pressure above the levels during the treatment periods but in 6 of the 8 patients concerned the blood pressure did not return to the initial control period levels.

(5) Six of the patients "felt better" shortly after joining the study and showed continuing symptomatic improvement throughout. Ten showed some initial improvement in symptoms but 5 did

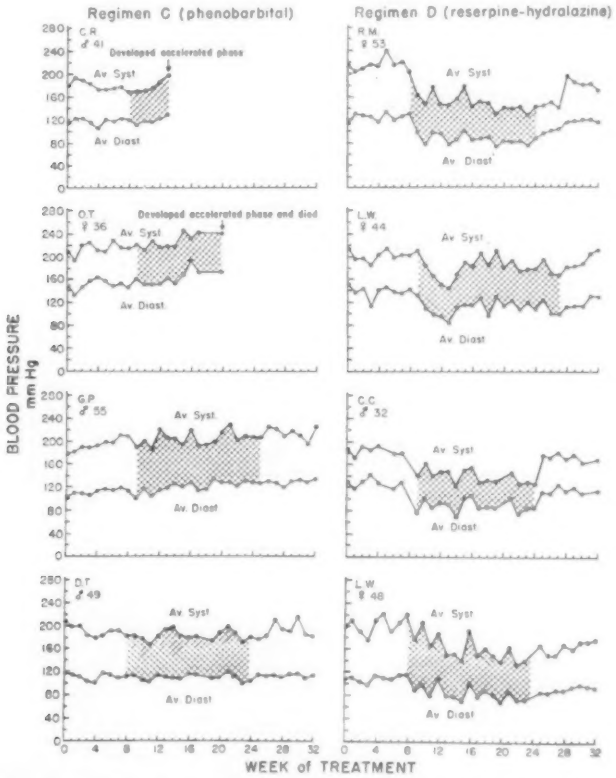

FIG. 2.—Graphs for patients receiving regimen C (8 weeks placebo, 16 weeks of phenobarbital, 8 weeks of placebo) and regimen D (8 weeks of placebo, 16 weeks of reserpine-hydralazine combination, 8 weeks of placebo).

not maintain their improvement and 5 were troubled by the side effects of the drugs. Two of the patients did poorly and developed the accelerated phase of the disease. One died and an autopsy revealed severe chronic pyelonephritis. The other was hospitalized and placed on other hypotensive agents believed to be "more effective". A third patient felt much better at first, in spite of a gradual rise in blood pressure throughout the 32 weeks, although in the final weeks he developed severe headaches. A fourth patient complained bitterly of drowsiness while on both reserpine and placebo. A fifth developed a serious depression during the treatment with reserpine and hydralazine, but was able to continue the regimen after a 2 week interval. Details about the progress of the patients is provided elsewhere (DORSETT *et al.*).

These data appear to support the view that variations in any individual patient's symptoms correlate poorly with such factors as participation in the study itself, the hypotensive effects of the drugs employed, changes in the levels of blood pressure, or the side effects of the drugs.

(6) The physician seeing the patients frequently experienced considerable concern about the progress of his patients. His only clues to a patient's progress were a weekly review of symptoms, an account of activities and experiences and a brief physical examination. Dependence upon knowledge of the patients' blood pressures and confidence that "effective treatment" is being given the patients appeared to be powerful factors in sustaining the physician's role in the treatment programme and might be expected to induce favourable responses in the patients concerned.

(7) The side effects of the drugs employed often provided the physician with clues from which he conjectured about the drug regimens. Although correct in his guesses about some treatments, he was wrong about others. The extent to which his conjectures altered his attitudes and feelings about an individual patient's treatment might be reflected in the patient's responses to treatment. Similarly, patients reported side effects which they related to changes in therapy, sometimes erroneously.

(8) All of the patients had been instructed not to inquire about their blood pressure readings but almost all of them did so at one time or another. They would indicate their interest by questions addressed to the nurse, such as, "Is it down today?" and "I know it is up today because my head hurts". Five of the patients admitted to the nurse that they had consulted their own physicians or the physician's nurse at sometime during the study to have their blood pressures taken, thereby defeating one of the "double-blind" features of the study.

DISCUSSION

The experimental design employed in this study has been of value in demonstrating the hypotensive efficacy of one treatment regimen and the relative ineffectiveness of three other regimens. The effective regimen consisted of a potent aura of special privilege which resulted in the selection of the patient for the study, weekly care by the same nurse and physician equivalent to good private medical care, the attentions of a sociologist in the Clinic and during a home visit, the services of other internists and an ophthalmologist, and the exhibition of reserpine and hydralazine. The validity and significance of the hypotensive response seems related to this specific drug combination since all the other factors in the other three regimens were similar. This particular experimental design may have wider application for the evaluation of other hypotensive agents proposed for the treatment of ambulant patients, but a critical discussion of some of its definite limitations is indicated.

(1) Considerable difficulty was experienced in finding enough patients who had significant "essential hypertension" uncomplicated by other diseases. These difficulties suggest the need for caution in selecting patients to participate in studies designed to evaluate hypotensive agents.

(2) Although all patients were told the general nature of the investigation and the necessity for weekly visits over a 32 week period, there were patients who missed occasional visits and others who complained about the frequency of visits. One factor which was most important in the continuity of follow-up was the relationship most of the patients established with the nurse participating in the study.

Of the 7 women in the study, all except possibly 1 made an event of their weekly clinic visits. Five of the husbands had to make special arrangements to bring them to the clinic, and some came from such distances that they had lunch and even dinner on the way. These occasions often afforded opportunities for marital companionship unexperienced for many years. Since 6 of the wives had indicated that they frequently had felt lonely or neglected in the past, it may not be unreasonable to speculate that

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the weekly trips with their husbands or friends may have been vital parts of the "good treatment regimens".

All the women were very interested in the physician directly responsible for their care and asked the nurse questions about his age, marital status, and one very obese, middle-aged woman developed a strong "crush" on the physician which she discussed in detail with the nurse. The women never inquired about the physician's medical ability. The men, on the other hand, showed little interest in the physician's personal life, but almost all asked questions about his medical ability. The men involved the nurse in their families more than the women did, and she became well-acquainted with 6 of the wives.

(3) There was at times considerable anxiety about the course of several of the patients on the part of the two investigators who knew the patients' blood pressures, their treatment regimens, and their clinical status, and in the interests of 2 of the patients their participation in the study had to be interrupted. There was anxiety therefore about the progress of their treatment by the patients themselves, by the physician seeing the patients, and by the other two responsible investigators. It would be unrealistic to think that some of the investigators' anxiety was not communicated to some of the patients and could have contributed to poor treatment responses.

(4) There were a number of alterations in the patients' life situations which appeared to be reflected in changes in their blood pressures, although documentation of these relationships was not part of the design of the study. A greater degree of sophistication in establishing these relationships might have permitted some evaluation of their intensity but would also have introduced an element of more specific psychotherapy and would have made it difficult to determine to what extent changes in the blood pressure might have been related to the pharmacologic agents employed.

(5) To be considered an effective hypotensive agent, a drug should be capable of lowering blood pressure in properly selected groups of patients to levels well below those occurring during two control periods in the face of over-all upward trends in the blood pressure and in spite of negative patient-physician relationships, fundamental deleterious emotional conflicts and high degrees of social stress. On the basis of present knowledge of the importance of emotional and social influences on blood pressure, claims made for hypotensive agents without consideration of these factors may be regarded with considerable scepticism.

CONCLUSION

A carefully controlled clinical evaluation of pharmacologic agents is a most difficult undertaking. Many variables may be partially controlled, but the subtleties of the patients' life situations, the intensities of the transference and counter-transference between physicians and nurses and patients, and the degrees of realistic and unrealistic anxiety by the investigators are factors which cannot be controlled by present techniques. All these influences but especially the elements of human variability, combined with the specific and non-specific side effects of the drugs employed impose serious limitations on the double-blind technique with which anyone employing it should be familiar.

Nevertheless, the necessity for evaluating new medical hypotensive agents makes highly desirable some attempt at controlled studies which take into account social

and emotional factors. The present study was an attempt to fulfill this need, and if its limitations are accepted, it may be a more useful means of evaluation than enthusiastic trials of new remedies in uncontrolled situations.

SUMMARY

An experimental design for evaluating the hypotensive effects of pharmacologic agents advocated for the ambulant treatment of essential hypertension is discussed. The design of the study utilized meticulous selection of patients with moderately severe, unequivocal essential hypertension, weekly clinic visits, a "social stress" index based on questionnaires and interview data obtained by sociologists, a double-blind technique with respect to the treatment regimens insofar as the responsible physician, nurse and the patients were concerned, a double-blind technique with respect to knowledge of the blood pressure readings insofar as the physician and patients were concerned, and random assignments to treatment regimens by a biostatistician in an attempt to control some of the social and emotional factors known to influence blood pressure. Of four regimens (placebo, phenobarbital, reserpine and reserpine combined with hydralazine), evaluated during a 32 week period which included two 8 week placebo periods before and after a 16 week treatment period, only one (reserpine combined with hydralazine) was found to have significant hypotensive properties.

The rationale for the particular experimental design employed, the problems encountered in its execution, and certain limitations implicit in the double-blind technique are discussed. In spite of the difficulties inherent in the long natural history of hypertension and the contribution of multiple aetiologic factors, especially social and emotional influences, rigorous experimental evaluation of hypotensive pharmacologic agents may be preferable to their enthusiastic trial in uncontrolled situations.

APPENDIX A: METHOD OF CALCULATING SOCIAL STRESS INDICES

*Situational pressures**

Index of Tension Potential (ITP) equals Spatial Index (SI) times the Destructiveness Quotient of family members (4 times number of pre-school children plus 2 times number of school age children plus 1 times the number of adolescents and adults in family) $\times$ 100.

Where: Spatial Index (SI) equals the Potential Interpersonal Relations in Family divided by the number of square feet of space in home (exclusive of hallways and carports or garages, attics or unfinished basements).

Where: Potential Interpersonal Relations (PR) equals number of persons in family squared minus number of persons in family divided by 2.

Using symbols: $PR = \frac{N^2 - N}{2}$ $SI = \frac{PR}{\text{No. of ft}^2 \text{ in home}}$

ITP = SI times (4 $\times$ number of pre-school children)
plus (2 $\times$ number of school children) plus
(1 $\times$ number of adolescents and adults) $\times$ 100.

Value conflicts in marriage†

In the inventory of marital values devised by Kirkpatrick and Hobart, patient and spouse each filled out the inventory as it applied to self and filled it out as they thought the spouse would fill it out. Opportunity is given in the inventory to express degree of agreement or disagreement with forty-one statements about desirables in marriage on a five point scale from strongly agree to strongly disagree.

* Bossard, 1951.
† Kirkpatrick and Hobart, 1954.

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Value Disagreement Score equals the sum of the distances between patient and spouse when their self statements are checked against each other. (For example: one patient checked SA, strongly agreed, while spouse check D, disagreed, on the statement "I want the kind of marriage in which the husband shows romantic attentions to his wife," a distance of three categories from each other.) By adding the distances obtained on all fourty-one statements an actual value disagreement score for the couple is obtained.

Projected Disagreement Score equals the sum of the distances between spouse's self statements and spouse's statements for the patient as he thinks the patient would have filled out the inventory. Vice versa the patient too has a projected disagreement score obtained by comparing his self statements with the inventory as he filled it out for his wife.

Misperception Score equals the sum of the distances between the inventory statements as filled out *for* the spouse and the way the spouse filled the same inventory for self. Vice versa the spouse's misperceptions can be scored by summing the distances between the inventory as filled out *for* the patient and the way the patient fills it out for himself.

Total Misperception Score equals the sum of the misperception scores of the patient and the spouse.

APPENDIX B: GROUP CHARACTERISTICS AND PATIENT ASSIGNMENTS

The 16 patients were not all available simultaneously and therefore arbitrary groupings in the high, middle and low ranges were made both for social stress indices and for systolic and diastolic pressures. Then, as each patient was classified in one of these groups, he was placed in one of the treatment regimens by use of random number tables; i.e. after giving to treatments A, B, C, D the numbers 1, 2, 3, 4,

		Patient	Treatment
Group I:	Systolic —High Diastolic —Middle Social Stress—High	L. G. R. A. R. M. C. R.	B (reserpine) A (placebo) D (reserpine-hydralazine) C (phenobarbital)
Group II:	Systolic —High Diastolic —High Social Stress—Middle	H. G. O. T. F. T. L. W.	B C A D
Group III:	Systolic —Low Diastolic —High-Middle Social Stress—Low-Middle	M. H. S. A. G. P. C. C.	A B C D
Group IV:	Systolic —High Diastolic —Low-Middle Social Stress—Low-Middle	G. H. D. T. L. W. E. B.	A C D B

respectively, a new patient was assigned a treatment by looking in a table of random numbers and reading until one of the four numbers 1, 2, 3, or 4 appeared. The patient then got this treatment. Once a treatment was assigned within any one group, that treatment was eliminated as a possibility for the next three patients for that group.

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PEPTIC ULCER AND MENTAL DISORDER*—II

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INTRODUCTION

IN Part I of this paper details were given of a survey carried out on patients in a psychiatric hospital to determine the frequency amongst them of a history of peptic ulcer. It was found that the incidence of ulcer was influenced by age, residence, and occupation in much the same way as has been found to be the case amongst mentally healthy individuals. As the survey was restricted to men, no information was available regarding the influence of sex.

In Part II, data are presented to elucidate whether peptic ulcer is more common in one kind of mental abnormality than another.

REVIEW OF THE LITERATURE

THE incidence of peptic ulcer in the general population varies greatly with sex and age, and to a lesser extent with residence, occupation, social class, country, and historical epoch. Despite this fact, many studies claiming to show that some particular psychiatric abnormality is or is not associated with peptic ulcer proceed without taking such factors into account, and are thereby vitiated. A further difficulty arises in the unreliability of psychiatric diagnosis: not only are the same observers inconsistent with themselves, but different observers use the same nomenclature according to their different backgrounds. Even by adopting an operational definition such as "an illness requiring admission to a mental hospital," a classification is provided that is so broad as possibly to be useless now that the less incapacitating illnesses are being increasingly treated in institutions which were formerly reserved as asylums for the insane.

It has been claimed that peptic ulcer is uncommon amongst psychotics. The topic has been reviewed by ROSS (1954). Studies of the incidence of ulcer diagnosed clinically in mental hospitals, such as those of HENRY (1924), PHILLIPS (1937), ROSENBLIETT and MANLEY (1940), ROSS, HAY and MCDOWELL (1950), SWARTZ and SEMRAD (1951), and BROSIN (1952), show an incidence of less than 2 per cent. RATHMELL and LIEBER (1943) and POLLAK and KREPLICK (1945) likewise found an incidence of ulcer amongst mental hospital autopsies of about 2 per cent. But without a description of the age and sex structure of the population at risk, or the findings from a well-matched control series, no conclusions can be drawn.

GREGG (1939) found peptic ulcer, as the registered cause of death amongst 600,000 deaths in the Massachusetts community, in general occurred three times more often than amongst 26,000 deaths in Massachusetts State Mental Hospitals. Likewise, SCHWARTZ (1951) found amongst 1967 deaths in Ypsilanti State Hospital that ulcer was the stated cause of death in 0·25 per cent of cases, whereas the U.S. national figures for the same period were 0·65 per cent. But again we cannot be sure that the populations at risk were similar in respect of age and sex, nor that the accuracy of diagnosis and standard of medical care were the same in the two series being compared.

The only numerical study to distinguish between psychotic and nonpsychotic cases in the same investigation is that of SWARTZ and SEMRAD (1951), but they failed to

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compare their two series in terms of age and sex; furthermore, the disorder investigated was not peptic ulcer alone, but was a collection of so-called psychosomatic conditions. The incidence of these conditions was 20 cases amongst 578 psychotics compared with an incidence of 12 cases amongst 264 nonpsychotics admitted to the same hospital. This difference is not significant ($\chi^2 = 0{\cdot}58$; $0{\cdot}30 < P < 0{\cdot}50$).

Another relevant field of enquiry is that of the incidence of neurosis amongst sufferers from peptic ulcer. In no study has there been a sufficiently well-matched control series for firm conclusions to be drawn; in general, no evidence has been brought forward to show that neurosis is more, or less, common amongst sufferers from peptic ulcer than in the general population.

GAINSBOROUGH and SLATER (1946) examined 162 cases of peptic ulcer and found a frank neurosis in 15 per cent, but did not give the age and sex distribution of their cases. They consider that this figure of 15 per cent is about the frequency of neurosis in the general population. Support for this contention comes from the work of FRASER (1947), who found amongst 3083 factory workers between the ages of 21 and 60 a frequency of 10 per cent for definite neurosis and 20 per cent for minor neurosis, with very little difference between the sexes. As both these studies were done in England at about the same time, and with roughly similar psychiatric criteria, there is some justification for comparing them. SULLIVAN and MCKELL (1950) in America found about the same incidence of neurosis amongst their 200 cases of peptic ulcer.

Numerous similar studies have been carried out in the armed forces. WADE (1942), KIRK (1943, 1946), SCHILDKROUT (1944), MONTGOMERY *et al.* (1944), HALSTED *et al.* (1946a, 1946b), and FRIEDMAN (1948) found the incidence of neurosis amongst sufferers from peptic ulcer to lie between 0 per cent and 22 per cent. The method used is certainly of questionable reliability when the results cover such a wide range, but it gains a little in value when we observe that the same investigators examining soldiers with nonulcer dyspepsia found the incidence of neurosis to lie between 32 per cent and 84 per cent. The conclusion may be drawn, therefore, that amongst men of military age who suffer from ulcer the incidence of neurosis is neither conspicuously high nor conspicuously low. It is worth noticing, however, how unreliable such observations may be. For example, CATHCART (1946) when reviewing very similar material, i.e. dyspeptic soldiers in the Canadian Army, came to precisely the opposite conclusion. He says, "Psychiatrically speaking, there is apparently no great difference between peptic ulcer and gastric neurosis except that the latter has a more heavily laden background of childhood conflict and neurotic traits, and in addition, increased somatic concern and awareness. The life adjustment is more faulty than in the ulcer case and the attempts to overcome the dependency urge are more feeble." It seems that while noting the same differences in the two conditions as did the other observers, CATHCART was more inclined to comment on their similarities, and so arrived at the opposite conclusion.

Studies purporting to show a high incidence of neurosis amongst patients with peptic ulcer are usually found to be lacking in some essential feature. For example, BÁRÁNY *et al.* (1950) failed to distinguish between a fully formed neurosis and the presence of some neurotic symptoms, a distinction admittedly difficult to make, but one that is essential if comparisons are to be made; similarly, the fact that COX and JUNNILA (1946) found a high incidence of neurosis is not surprising when one remembers that the hospital where they were working had been established for psychiatric war casualties.

The literature thus provides no reliable evidence regarding the incidence of peptic ulcer amongst psychotics nor of the incidence of neurosis amongst patients with peptic ulcer. Turning to the question of a possible association between peptic ulcer and a particular kind of mental disorder, the literature is more rewarding.

LOVETT DOUST (1952) showed by means of a questionnaire that the incidence of physical illness in general in the histories of psychiatric patients was higher than in a control population of mentally healthy individuals. Moreover, he showed that there was a positive correlation between the incidence of peptic ulcer and the diagnosis of affective psychosis (depression), and a negative correlation between its incidence and schizophrenia and psychoneurosis. Whereas allowances were made for differences in the age and sex structures of the populations concerned in examining the incidence of

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icalphys illness in general, the method used allowed no such correction to be made when examining the incidence of the single condition of peptic ulcer. Indeed, the fact that the mean age of the group of depressives was higher by ten years than that for the group of schizophrenics and for the group of psychoneurotics makes it doubtful whether the psychiatric diagnosis is the important variable. The results are therefore inconclusive.

Ross, Hay, and McDowell (1950) found that amongst their nine ulcer cases in a mental hospital the diagnosis of mania occurred surprisingly often; moreover, of their three ulcer cases with schizophrenia all had had periods of excitement. But without correction for the age and sex factors little weight can be given to such figures, particularly as they have not been confirmed in a similar study by Rosenbliett and Manley (1940).

The most careful work in this field is that of Wretmark (1953). From his study of the personality of ulcer patients, using Sjöbring's method, he predicted to what sorts of mental disorder ulcer patients would be most prone. Such a prediction is possible because Sjöbring (1923) conceived his dimensions of personality as relating to certain mental disorders. There are four such dimensions in Sjöbring's system; one, for example, is the quality of personality called "Validity," which is conceived of as being normally distributed throughout the population and of representing, roughly, the availability of energy, resolution, and self-reliance; those lacking this quality to a conspicuous degree suffer from the neurotic disorder of asthenia. When one of the other three qualities is lacking, oligophrenia, hysteria, or depression is the result. Wretmark found from a study of the personality of ulcer patients along these lines that the distribution of the four measures was different in duodenal-ulcer patients than in normals, or in gastric-ulcer patients. In this way he was able to predict that duodenal-ulcer patients would be more likely to suffer from asthenic and hysterical disorders, and less likely to suffer from endogenous depression and oligophrenia than individuals without ulcer. Turning to the records of a large psychiatric clinic in Sweden in which 96 cases of duodenal ulcer were discovered, these predictions were found to be correct in respect of depression, oligophrenia, and asthenia, but not in respect of hysteria. This is a most interesting result and deserves confirmation, the more so in that it supports Sjöbring's theoretical structure which is so little known outside Scandanavia.

Wretmark's method, however, is not above criticism. In the records of the clinic he found 96 male cases of proven duodenal ulcer, and noted down the psychiatric diagnosis (sometimes more than one diagnosis) in each case. To form his control series, he took the next male case in the records to fall within the same five-year age group, and again noted down the psychiatric diagnosis. He is, therefore, comparing the distribution of ulcer cases amongst his 16 psychiatric diagnostic categories with the distribution of a series of nonulcer controls amongst the same categories. He seeks to discover whether the differences between the two distributions might reasonably be accounted for by chance, and if not, whether the differences in the particular categories referred to by Sjöbring are in the predicted direction.

The method used is to compare the percentage of cases with ulcer in any one category with the percentage without ulcer in the same category, and to calculate the critical ratio. This is done separately for each of the four categories in which a prediction is possible. But the figures in each class are not entirely independent, as a high percentage in one category might produce a low percentage in another. Whether this will be so for the particular four categories under consideration cannot be known; and so, ideally, all the data should be taken together. Unfortunately, this cannot be

done, because some cases having mixed psychiatric disorders appear in more than one diagnostic category, and there is no means of telling which they are.

THE CONTROL SERIES

By the nature of the investigation it was not possible to examine an exactly comparable series of psychiatrically normal individuals. Recently, however, a survey has been carried out by DOLL and AVERY JONES (1951) amongst actively working men, and this may be used for at least tentative comparison. In 1951 these workers reported an investigation of the influence of occupation on the incidence of peptic ulcer. They selected a number of occupations which previous studies had suggested as bearing on the incidence of ulcer, and having gained the co-operation of the relevant factories, interviewed each worker individually, questioning him or her about a history of dyspepsia or frank ulcer. In this way they obtained two categories of individuals with ulcer:

(1) *Proved Ulcers.* "Cases were considered to be ones of proved ulcer if they gave a history of ever having been found radiographically positive at hospital; if radiographically positive evidence was obtained during the investigation; if they had had an ulcer confirmed at operation; or if they had had a haematemasis not proved to be due to some other cause."

(2) *Presumptive Ulcers.* ". . . a group of cases considered to have ulcers on the history of the pain alone without objective supporting evidence. The group includes cases in which it was impossible to arrange radiographic examination and those in which such an examination gave a negative result despite a strongly suggestive history."

In our own series the evidence for the diagnosis of ulcer was not always stated. In most cases, however, it was described and was of the sort that would correspond with DOLL and AVERY JONES's category of "Proved Ulcer." When it was not stated, however, the possibility remained that the diagnosis was made on a suggestive history alone, in which case "Presumptive Ulcer" would have been the appropriate category. Furthermore, since all our cases were patients in hospital it could hardly arise that "it was impossible to arrange radiographic examination"; in which case a few patients who, in DOLL and AVERY JONES's study, would have been classified as "Presumptive Ulcers" would in our series be provided with objective evidence of an ulcer and would thereby have come to be classified as "Proved Ulcers." On the other hand, all the control cases were questioned specifically regarding any history of dyspepsia, while our own cases were only questioned more generally regarding their past illnesses, so that a few cases of ulcer may have been missed.

It would seem, therefore, that our method of examination would discover most of DOLL and AVERY JONES's "Proved Ulcers" together with a few "Presumptive Ulcers." In comparing the two series, we should expect our method, when applied to a working population of the kind examined by DOLL and AVERY JONES, to give results lying between those found for "Proved Ulcers" and those found for "Proved Ulcers" plus "Presumptive Ulcers." Because of the differences in the methods used, a closer comparison of the two series is not justifiable.

When comparing the incidence of ulcer in two series, it is necessary to ascertain whether the two populations under examination are similar in certain respects, in particular with regard to historical epoch, country, sex, age, urban or rural residence, social class, and occupation.

There is considerable indirect evidence that with the passage of time not only diagnostic standards, but also the actual incidence of ulcer, is changing. It is therefore important that the two series to be

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compared are observed in the same historical epoch. DOLL and AVERY JONES observed their cases from 1946 to 1947; our cases were seen from 1950 to 1954. These dates are so close that in this respect the two series are comparable. Figures for the incidence of peptic ulcer differ greatly according to their country of origin, and it is therefore notable that both series were observed in Great Britain at centres in London.

DOLL and AVERY JONES give their results separately for men and for women, and divide their data into the same ten-year age groups as in the present study. Correction may therefore be made for the influence of both sex and age. Both series drew the majority of their material from Greater London, but included some from other urban and some rural areas. DOLL and AVERY JONES do not give exact figures for the partition of their material between urban and rural residence, but they write: "Seventeen firms co-operated in the survey, of which fifteen were in the London area, one was in a small provincial town, and one in a village. In addition, a number of farm workers working for thirteen different employers were investigated, to provide a sample of rural workers." 86 per cent of our material was derived from Greater London and 5·5 per cent from rural areas (see Table 3 in Part I). It seems likely, therefore, that the two series are comparable in respect of urban and rural residence.

Social class and occupation are to some extent interdependent, and so an examination of the differences of one of them in the two series is sufficient. Here there are sizable discrepancies. DOLL and AVERY JONES's material was culled from particular industries, while we accepted any case coming to a psychiatric clinic irrespective of occupation.

In Table 1, DOLL and AVERY JONES's material has been grouped into the categories used in the present study, and the results presented for comparison. It will be seen that

TABLE 1.—OCCUPATIONAL STRUCTURE OF PRESENT SERIES COMPARED WITH THAT OF DOLL AND AVERY JONES (1951)

Occupation	Present series (number of men: 2068) per cent of series	Series of DOLL and A. JONES (number of men: 4901) per cent of series
Doctors	2·4	2·6
Other professions	10·8	4·1
Managerial and executive	9·5	5·5
Foremen	3·2	5·2
Transport workers	2·0	18·8
Clerks	13·1	7·0
Other skilled workers	30·8	21·3
Other semi-skilled workers	9·3	10·9
Other unskilled workers	12·0	17·2
Agricultural workers	1·5	4·1
Students	3·6	3·4
Unemployable	1·7	0·0
Total	99·9	100·1

in our study there were disproportionately many men in other professions, executive, managerial, and clerical jobs, and disproportionately few men in the transport and agricultural industries. But the influence of occupation, though definite, is so small that these disproportionately represented groups are not likely to distort materially the figures for the incidence of peptic ulcer. According to their study, we should expect our greater representation of other professions and clerks (sedentary workers) to make our incidence of ulcer too low; whereas the over-representation of executive and

managerial and the scarcity of agricultural workers would make our incidence too high. We shall assume that these opposite tendencies cancel each other out for all practical purposes.

Although this population of men actively working in various occupations is taken as a psychiatrically normal one, it should be remembered that, according to FRASER (1947), in such a population there would be about 10 per cent with a definite neurosis and about 20 per cent with a minor neurosis.

RESULTS

In some of the tables that follow, the actual number of ulcers found in any particular psychiatric diagnostic category is compared with the number of ulcers expected according to three different sets of experience, labelled *A*, *B*, and *C*, age being taken into account. Under *A* is given the number expected according to the experience of DOLL and AVERY JONES for proved ulcers; under *B* is given the number expected for proved plus presumptive ulcers; and under *C* is given the number expected according to the experience of the entire present survey irrespective of psychiatric diagnosis, in all cases age being taken into account.

For example, in the diagnostic category "Schizophrenia" there were 117 men in the 16–25-year age group. In working-men DOLL and AVERY JONES found an incidence of proved ulcer in this age group of 1·0 per cent; we should therefore expect 1·17 proved ulcers in our 117 men. Similarly, there were 178 schizophrenics in the 25–35-year age group, and for this same age group DOLL and AVERY JONES found an incidence of 2·7 per cent for "Proved Ulcer"; this would give an expected number of "Proved Ulcers" of 4·89 in our 178 schizophrenics. When a similar operation has been carried out for each of the five age groups, we get a total of 12·47 cases expected in our 399 schizophrenics; this figure appears in column *A*. Likewise, DOLL and AVERY JONES found in the 16–25-year age group an incidence of 1·8 per cent for proved plus presumptive ulcers, and so in our 117 men we should expect 2·11 ulcers and for all the five age groups together we should expect 16·07 ulcers; this figure appears in column *B*. In the entire present series there were 334 men in the 16–25-year age group, of which 3 had ulcers, which gives an incidence of 0·9 per cent. In 117 schizophrenics, therefore, if psychiatric diagnosis made no difference, we should expect 1·05 ulcers; the sum of these expected numbers for all age groups together is 12·23, and appears in column *C*.

In this way, for each psychiatric diagnosis figures are provided with which to compare the actual number of ulcers observed, age having been taken into account. The number expected in a working population of similar age structure would lie somewhere between the values given in columns *A* and *B*; the number expected on the null hypothesis that psychiatric diagnosis has no influence on the incidence of ulcer is given in column *C*.

In the tables that follow there is also a column headed "Diagnostic Code Numbers." In this column appear code numbers from the International List of Diseases and Causes of Death (Geneva, October 1947) to indicate more precisely which diagnostic categories are being referred to.

The first task was to discover whether the incidence of peptic ulcer was significantly influenced by psychiatric diagnosis as such. As psychiatric diagnosis is so poorly based on aetiological or psycho-pathological knowledge, it was difficult to decide how

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to divide up the data so that different incidences of ulcer might possibly be demonstrated. First, the obvious division of mental disorders suggested by the International List of Diseases and Causes of Death (1947) was used, namely, psychoses (code numbers 300–309), neuroses (code numbers 310–318), character disorders (code numbers 320–326), and others (all other code numbers). The incidence of ulcer in each group was compared with the number of ulcers expected in a group of the same age structure based on the experience of the entire series irrespective of psychiatric diagnosis, and the results are given in Table 2. For the whole table, $\chi^2 = 21{\cdot}44, n = 3, P < 0{\cdot}001$,

TABLE 2.—THE INCIDENCE OF PEPTIC ULCER IN SOME BROAD GROUPS OF PSYCHIATRIC DIAGNOSIS COMPARED WITH THE INCIDENCE EXPECTED FROM THE ENTIRE SERIES AFTER CORRECTION FOR AGE

Group of psychiatric diagnosis	Diagnostic code numbers	Number of men	Ulcers seen	Ulcers expected from entire series corrected for age C
Psychoses	300–309	930	35	58·6
Neuroses	310–318	745	62	42·1
Character disorders	320–326	265	16	12·1
Others	All others	128	8	8·3
	Total	2068	121	121·1

$\chi^2 = 21{\cdot}44, \quad n = 3, \quad P < 0{\cdot}001.$

from which we may conclude that it is extremely unlikely that the difference between the observed and expected numbers of ulcer in the four groups taken together would occur by chance.

But classifying psychiatric disorders in this way depends upon similarities in descriptive features of illnesses that are vastly different in other respects. For example, in the group of psychoses come both paranoid schizophrenia, in which the illness appears to be the outcome of a longstanding psycho-pathological process in a particularly susceptible individual, and toxic confusional states arising, for example, from heart failure; similarly, it seems extremely arbitrary to group together involutional melancholia with its contributory antecedents in the personality and its transitory character, along with the presenile dementias with their progressive brain pathology. It was therefore thought necessary to divide up the data in such a way that the incidence of ulcer could be compared in a number of possibly more consistent groups.

The grouping decided upon was as follows:

(1) *Functional psychoses.* These included those psychotic reactions having no commonly accepted brain pathology or aetiological agent, i.e. all the schizophrenias, all the manic-depressive reactions, involutional melancholia, and paranoia and paranoid states.

(2) *Definite neuroses.* These included all the neuroses with the exception of those centring upon an anatomical system, e.g. the stomach or the lungs, as current arguments throw doubt on whether these do not have more in common psycho-pathologically with the psychoses than the neuroses; this group therefore included anxiety

states, hysteria, phobic reactions, obsessive-compulsive reaction, and various mixed psychoneurotic states.

(3) *Other disorders.* These included the remainder of the data.

The results are given in Table 3; comparing the observed number of ulcers in each category with the value given in column *C*, we get for the whole table $\chi^2 = 13{\cdot}87$, $n = 2$, $0{\cdot}001 < P < 0{\cdot}01$, from which we can again conclude that the differences are not likely to be due to chance.

Table 3 shows that the incidence of ulcer in the functional psychoses is lower than that expected from the experience of the whole series, and in the definite neuroses it

TABLE 3.—THE INCIDENCE OF PEPTIC ULCER IN SOME NARROWER GROUPS OF PSYCHIATRIC DIAGNOSIS COMPARED WITH THE INCIDENCE EXPECTED IN NORMALS AND FROM THE ENTIRE SERIES BOTH AFTER CORRECTION FOR AGE

Group of psychiatric diagnosis	Diagnostic code numbers	Number of men	Ulcers seen	Ulcers expected corrected for age, according to		
				Normals		All of series
				A	*B*	*C*
Functional psychoses	300–303	815	30	37·4	47·6	48·3
Definite neuroses	310–314 and 318	722	56	33·0	41·7	40·7
Others	All others	531	35	25·0	32·3	31·9
	Total	2068	121	95·4	121·6	120·9

is higher. The incidence of ulcer in these categories was therefore compared with that found in mentally normal individuals. The control series derived from the work of DOLL and AVERY JONES was used, and the comparable figures are shown in columns *A* and *B*. The incidence amongst functional psychotics is lower than the lowest expected amongst normals of the same age (column *A*), and amongst definite neurotics it is higher than the highest incidence expected amongst normals (column *B*).

When the population used for comparison is very large and the chance of an event occurring is small, then the standard error of the expected value may be taken as its square-root. Thus for functional psychoses the lowest expected incidence amongst normals, together with the range included by twice the standard error, is $37{\cdot}4 \pm 12{\cdot}2$; as the observed value of 30 falls well within this range, the difference can be accorded little significance. For definite neuroses the highest expected incidence amongst normals together with the range included by twice the standard error is $41{\cdot}7 \pm 12{\cdot}9$; in this case the observed value of 56 falls outside the range and so the difference is not likely to be a chance occurrence.

Finally, the findings in the individual psychiatric diagnostic categories are set out in Table 4; fuller details are to be found in GOSLING (1956). In many categories the number of cases observed is too small for any conclusion to be drawn or for the data to be analysed statistically together. But four categories in particular deserve comment: schizophrenia, neurotic depressive reaction, alcoholism, and neurosis with respiratory symptoms.

TABLE 4.—THE INCIDENCE OF PEPTIC ULCER IN VARIOUS PSYCHIATRIC DIAGNOSTIC CATEGORIES

Psychiatric diagnosis	Code number (international list of diseases and causes of death, 1947)	Number of men	Number of peptic ulcers seen	Number of peptic ulcers expected corrected for age according to:		
				Normals (DOLL and A. JONES)		All of present series
				A	*B*	*C*
Schizophrenia	300	399	4	12·5	16·1	12·2
Manic-depressive reaction:						
Mania	301·0	53	3	2·9	3·7	4·0
Depression	301·1 and 301·2	249	17	14·3	18·0	20·2
Involutional melancholia	302	78	5	5·6	7·2	9·2
Paranoia and paranoid states	303	36	1	2·1	2·7	2·7
Organic reaction types and other psychoses	303–309 and 025	132	6	8·0	10·4	11·7
Anxiety reaction	310	182	11	7·4	9·4	8·3
Hysterical reaction	311	85	6	3·8	4·8	5·0
Phobic reaction	312	10	0	0·4	0·5	0·4
Obsessive compulsive reaction	313	73	3	2·4	3·2	2·7
Neurotic depressive reaction	314	318	32	16·4	20·8	21·4
Neurosis with:						
Circulatory symptoms	315	4	1	0·2	0·2	0·2
Digestive symptoms	316	8	1	0·4	0·5	0·5
Respiratory symptoms	317	11	4	0·5	0·7	0·6
Mixed and unspecified neurosis	318	54	4	2·5	3·1	2·8
Pathological personality	320	101	3	3·5	4·4	3·6
Immature personality and Disorders of intelligence and of specific behaviour	321, 325 and 326	63	1	1·5	1·9	1·5
Alcoholism	322	85	12	4·9	6·1	6·2
Other drug addiction	323	16	0	0·7	0·9	0·8
Epilepsy	353 and 780	67	2	2·6	3·5	3·1
Diagnosis uncertain and no psychiatric abnormality	327, 328 and others	44	5	2·8	3·5	3·8
	Total	2068	121	95·4	121·6	120·9

In the first three, which contain a sufficient number of cases, it is possible to calculate the probability of obtaining the difference between the observed and expected values by means of the χ^2 test, the experience of each group separately being compared with that of the rest of the survey. For example, the probability of obtaining the frequency observed for schizophrenia by chance can be obtained from the data in Table 5, whence $\chi^2 = 6{\cdot}34$, $n = 1$, $0{\cdot}01 < P < 0{\cdot}02$. Thus the low incidence of peptic ulcer amongst schizophrenics appears to be significant. Similarly for neurotic depressive reaction, $\chi^2 = 6{\cdot}83$, $n = 1$, $0{\cdot}001 < P < 0{\cdot}01$; and for alcoholism $\chi^2 = 6{\cdot}16$, $n = 1$, $0{\cdot}01 < P < 0{\cdot}02$. Thus the high incidence of ulcer amongst neurotic depressives and alcoholics also appears to be significant.

TABLE 5.—THE INCIDENCE OF PEPTIC ULCER AMONGST SCHIZOPHRENICS COMPARED WITH THE INCIDENCE EXPECTED FROM THE ENTIRE SERIES; AGE BEING TAKEN INTO ACCOUNT

Observed incidence				Expected incidence			
Psychiatric diagnosis	Ulcer	Non-ulcer	Total	Psychiatric diagnosis	Ulcer	Non-ulcer	Total
Schizophrenics	4	395	399	Schizophrenics	12·2	386·8	399·0
Others	117	1552	1669	Others	108·8	1560·2	1669·0
Total	121	1947	2068	Total	121·0	1947·0	2068·0

In the fourth category, neurosis with respiratory symptoms, the numbers are so small that this test cannot be applied: in eleven cases four ulcers were observed when only 0·6 would be expected. According to the Poisson distribution, such a finding would be expected by chance no more than three times in one hundred trials, i.e. $P < 0{\cdot}03$.

These statements of probability cannot, however, be taken at their face value when the number of categories analysed is considerable, as in this case, namely, 20. Obviously there is nothing extraordinary in finding a one-in-twenty chance once in twenty categories. In general, if the probability of occurrence of a certain event in a single trial is p, the probability that it will occur once or more often in a series of twenty trials is given by:

$$P = 1 - (1 - p)^{20}$$

which for $p < 0{\cdot}03$ gives $P < 0{\cdot}46$. In order to obtain $P < 0{\cdot}05$, it would be necessary for p to be $< 0{\cdot}003$. Such a strict test of significance is desirable, but would require so large a series of cases that the investigation would have been impossible under the circumstances. The results must therefore be taken as they stand, and must await confirmation from either a similar investigation or a different approach to the problem.

DISCUSSION

(1) *Schizophrenia.* Amongst the schizophrenics there were 4 cases of ulcer, whereas amongst mentally healthy men of the same age between 12 and 16 would have been expected. All four cases occurred in men with the paranoid type of schizophrenia; and so the question was raised whether this association resulted from the fact that ulcers, like paranoid illnesses, tend to occur in older men, or whether it depended upon some aspect of paranoid schizophrenia that facilitates peptic ulceration, as suggested by the work of KATZ (1954). In a Rorschach study of schizophrenics KATZ found that those with an ulcer showed greater affective responsiveness in their Rorschach records. On investigation it was found that of the 104 schizophrenics over the age of 35, when ulcer becomes more common, 71 were of the paranoid type. This high proportion of paranoid schizophrenics in the age groups most prone to ulcer probably explains the association.

It was possible that the low incidence of ulcer amongst schizophrenics might be the result of a selection of individuals with occupations that are rarely associated with ulcer. In Part I we saw that in the present survey the only occupation to show a notably different incidence of ulcer was that of foreman, in which the incidence was unusually high. It was indeed found that whereas foremen represented 3·2 per cent of the whole survey, they represented only 0·3 per cent of schizophrenics, which is hardly surprising when one considers what attributes of personality are required in foremen. It appeared therefore as if this differential selection, which excluded foremen, might have contributed to the low incidence of ulcer amongst schizophrenics. But even if it had the contribution can be shown to have been small: in our study 16 per cent of foremen had ulcers; if we assume that the proportion of foremen amongst schizophrenics was the same as that for the whole survey, namely 3·2 per cent instead of 0·3 per cent, they would have contributed only another two cases of ulcer. This would have made the number of ulcers observed 6 instead of 4, compared with the excepted number of between 12 and 16.

The low incidence might also have been the result of schizophrenics in general failing to report that they had suffered from a peptic ulcer in the past when in fact they had. There is no method of disproving this, although it should be remembered that only cases preserving enough contact with their environment to be admitted as voluntary patients were included in the survey, and that in most cases the patient's mental state, or the presence of a member of his family permitted a fairly full history to be taken. Cases in which the history was clearly inadequate numbered only 15, and were excluded (see page 288).

It has sometimes been suggested that the supposed low incidence of ulcer amongst psychotics is the result of the sheltered environment that most are provided with. But this cannot be invoked to

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explain this finding of a low incidence among schizophrenics, as none could be considered institutionalized and no more than 1·4 per cent of the whole survey was in hospital continuously for more than a year; although some cases had at some time previously been in a mental hospital, they had invariably shown sufficient social adaptability to live outside in the meantime.

The trend of these results is not in line with the findings of WRETMARK (1953). He found that in a population of psychiatric patients the diagnosis of schizophrenia appeared six times amongst 128 patients with peptic ulcer and only three times amongst patients of a similar age but without ulcer. But the numbers are small and there is an unknown amount of duplication of cases in his data.

(2) *Neurotic depressive reaction.* Amongst patients with neurotic depression there were 32 cases of ulcer observed when only between 16 and 21 would have been expected amongst mentally healthy men of the same age. Whilst all the neurotic categories tended to show a high incidence of ulcer, in none was it higher than in neurotic depressive reaction.

This result cannot be due to a tendency of foremen to suffer from neurotic depression, as they represented no more than 3·8 per cent of such depressions compared with 3·2 per cent of the whole survey. Nor can it easily be explained by assuming that there is in this category a host of querulous, disheartened individuals who let no hint of bodily infirmity go by without bringing it to the doctor's attention. For, using another group of individuals who might be expected to be equally ready to complain of any bodily discomfort presenting itself to consciousness, a quite different result is obtained. Grouping together anxiety reaction, hysteria, phobic and obsessive-compulsive reaction, neurosis with gastrointestinal symptoms, hypochondriasis, and other mixed neuroses there is an observed incidence of ulcer of 23 (out of 395 cases), certainly a little greater incidence than that expected in a mentally normal population of the same age structure, i.e. 16 to 20, but which nowhere approaches so great an excess as 32 observed ulcers amongst 318 neurotic depressives, when only 16 to 21 would be expected.

So far as they go, WRETMARK's data suggest a similar tendency. Other studies have not singled out this particular form of neurotic reaction for investigation.

(3) *Alcoholism.* Amongst patients admitted to hospital for the treatment of alcoholic addiction there was a high incidence of ulcer, 12 cases being observed as against between 5 and 6 expected amongst mentally healthy men of the same age.

The proportion of alcoholics who were foremen was almost exactly the same as that for the whole survey, i.e. 3·5 per cent. It must be remembered that of all alcoholics, those admitted to hospital for treatment are but a small selection. Cases are selected for admission that show a number of rather ill-defined characteristics thought to indicate a good prognosis; and it seemed possible that alcoholics were being favoured who were suffering from a neurotic depression and were using alcohol for symptomatic relief. Such a criterion is not used explicitly for the admission of cases, but it was thought possible that features of an affective disorder showing through the addict's behaviour might hint at the possibility of change and so provide the cue for admission to hospital. That this is not the case is suggested by DAVIES (personal communication), who found in 50 consecutive alcoholic addicts admitted to the Maudsley Hospital notable depressive features in only 6.

As in this study a haematemasis was accepted as evidence of a peptic ulcer, there was also the possibility that cases of a ruptured oesophageal varix as a consequence of hepatic cirrhosis had been included. But in view of the very bad prognosis of this condition, it is not likely that cases would have survived long enough to have entered a psychiatric hospital later for the treatment of their addiction.

WRETMARK (1953) found chronic alcoholism slightly more often amongst his psychiatric patients with ulcer than amongst those without. KAPP, ROSENBAUM, and ROMANO (1947), when seeking 20 peptic-ulcer patients in a medical ward, for investigation of their personalities, found they had included no fewer than 8 alcoholics; but such a striking fact might well be the result of their particular method of selection of cases.

It might be thought that individuals habitually pouring alcohol onto their gastric mucosa would be likely to suffer from peptic ulcer. That the connection is not so

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simple is indicated by the work of HAGNELL and WRETMARK (1957), who found not only a higher incidence of ulcer amongst 130 alcoholics than in the general population, but also that the ulcer as often preceded the alcoholism as followed it.

(4) *Asthma.* The category, neurosis with respiratory symptoms, in fact consisted of 11 cases of asthma, and to find amongst them 4 cases of ulcer was surprising. With such small figures, however, only the most tentative conclusions can be drawn; furthermore, the case of asthma that is admitted to a psychiatric hospital for treatment may not be in any way typical of the majority of asthmatics. Some confirmation of our results was found, however, from a nearby general hospital (through the kindness of Dr. BRUCE PEARSON): when 30 men attending the asthma out-patient Clinic there were asked to fill in the Cornell Medical Index Health Questionnaire, they were found to include 5 cases of ulcer when only 1·4 to 1·7 would be expected in such a population as that examined by DOLL and AVERY JONES (1951). One would expect the questionnaire method of detecting ulcers to give, if anything, a lower figure than their method of active enquiry into dyspepsia, and so this excess of ulcers observed would seem to be significant.

No studies of this point have been found in the literature. MOSCHCOWITZ and ROUDIN (1948) studied the association of a number of different psychosomatic complaints, but their data are not adequate for an assessment of significance.

(5) *Sjöbring's hypotheses.* An attempt to confirm WRETMARK's findings based on SJÖBRING's hypotheses (see page 287) was made. Unfortunately, his findings applied only to cases of duodenal ulcer, and in the present survey a distinction between gastric and duodenal ulcers could not be maintained; nevertheless, it was thought worth while to discover whether the two types combined showed the same tendency as WRETMARK found for duodenal ulcers alone.

Nosological difficulties are formidable in psychiatry, and they are greatest when studies done in different countries are to be compared. Scandinavian psychiatry draws more on the German school of constitutional psychiatry than does the British, which is more influenced by the Meyerian theory of "Reaction Types." The various categories used in one system, being defined as much by usage as by explicit criteria, are not easily equated with those of another. With the help of several Swedish workers, including WRETMARK himself, it has been possible to group our diagnostic categories in a way that corresponds fairly closely with the diagnostic groups used in Sweden.

According to the hypotheses of SJÖBRING and the findings of WRETMARK concerning the personalities of patients with duodenal ulcer, it was predicted that ulcer patients would be relatively prone to asthenic insufficiency and hysterical insufficiency, and relatively immune to manic-depressive psychosis and oligophrenia. Our data were therefore arranged in this way, with the exception of oligophrenia, for which there were too few cases. The results are shown in Table 6, from which it can be seen that although the differences are in the predicted directions, they are of a magnitude that might easily occur by chance. Our failure to support the hypothesis more clearly may be due to the diluting effect of the gastric-ulcer cases in our data.

Looking at the four categories individually it can be seen that in general the findings are in line with those of WRETMARK. He found no significant tendency for ulcer patients to suffer from hysteria as confirmed in this study. For oligophrenia we had no data to contribute. He found ulcer patients only rarely suffering from manic-depressive psychosis and involutional melancholia; the same tendency but to an insignificant degree is found in the present study. In his category "Asthenic Insufficiency" we included anxiety states, asthenic reactions, unspecified psychoneurotic disorders, passive dependent personalities, and unspecified immature personalities, and found a certain tendency for such cases to suffer from ulcer (13 cases compared with 9·6 cases expected), though to a less marked degree than did WRETMARK.

There are at least two possible reasons why our results do not parallel those of WRETMARK more closely. First, the unavoidable inclusion of cases of gastric ulcer in our data may mask the influence

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TABLE 6.—THE INCIDENCE OF PEPTIC ULCER IN PSYCHIATRIC DIAGNOSTIC GROUPS PREDICTED BY WRETMARK FROM SJÖBRING'S HYPOTHESES TO HAVE A HIGH OR A LOW INCIDENCE OF ULCER

Group of psychiatric diagnosis	WRETMARK'S prediction of ulcer incidence	Diagnostic code numbers	Number of men	Ulcers seen	Ulcers expected from entire series corrected for age
Manic-depressive psychosis Endogenous depression	Low	301·0–301·2, 302, 320·2	383	25	33·4
Insuffi. asthenica Insuffi. hysterica	High	310, 311, 318·3, 318·5 321·1	302	19	14·6
Others	None	All others	1383	77	73·0
		Total	2068	121	121·0

$\chi^2 = 3{\cdot}939, \quad n = 2, \quad 0{\cdot}01 < P < 0{\cdot}20$

of the duodenal-ulcer cases; and second, the dividing up of the material into diagnostic categories according to slightly different conceptual systems may prevent the reproduction of significant associations.

The first possible reason may be put to the test. WRETMARK's data have been reworked to include both gastric and duodenal ulcers and are shown in Table 7. The differences observed, as measured by the critical ratio, are a little smaller than when the data are confined to duodenal-ulcer cases, but they are of the same order of magnitude.

In an attempt to reproduce his experiment as closely as possible, a control series was assembled in much the same way as was his. He selected as a control the next male case in the hospital records to fall within the same five-year age group as each peptic-ulcer case, and noted down the psychiatric diagnosis. This was repeated, except that the next patient within the same ten-year age group had to be taken owing to the original design of the experiment. There was, therefore, a series of 121 peptic-ulcer cases, and a series of 121 male controls of a similar age structure; after allotting them to

TABLE 7.—WRETMARK'S DATA: THE DISTRIBUTION OF THE CONTROL CASES AND THE PEPTIC ULCER CASES AMONGST THE FOUR PSYCHIATRIC DIAGNOSTIC GROUPS RELATED TO SJÖBRING'S HYPOTHESES

Group of psychiatric diagnosis	Control series (128 cases)		Peptic ulcer series (128 cases)		Difference $d \pm \sigma(d)$ per cent	Critical ratio $\frac{d}{\sigma(d)}$
	Number	per cent	Number	per cent		
Manic-depressive psychosis and endogenous depression	49	38·3 ± 4·3	18	14·0 ± 3·1	24·2 ± 5·3	4·6
Insuffi. asthenica	3	2·3 ± 1·3	17	13·3 ± 3·0	11·0 ± 3·3	3·3
Insuffi. hysterica	5	3·9 ± 1·7	4	3·3 ± 1·6	0·6 ± 2·3	0·3
Oligophrenia	8	6·3 ± 2·1	2	1·6 ± 1·0	4·7 ± 2·4	2·0

his sixteen diagnostic categories, the data could be analysed in the same way. The results are given in Table 8. They parallel those of WRETMARK only so very loosely that it hardly seems that it is the inclusion of cases of gastric ulcer that accounts for the disparity in the results of the two studies. Evidently the reason must be sought elsewhere.

TABLE 8.—OUR DATA: THE DISTRIBUTION OF THE CONTROL CASES AND THE PEPTIC ULCER CASES AMONGST THE FOUR PSYCHIATRIC DIAGNOSTIC GROUPS RELATED TO SJÖBRING'S HYPOTHESES

Group of psychiatric diagnosis	Control series (121 cases)		Peptic ulcer series (121 cases)		Difference $d \pm \sigma(d)$ per cent	Critical ratio $\frac{d}{\sigma(d)}$
	Number	per cent	Number	per cent		
Manic-depressive psychosis and endogenous depression	29	24·0 ± 4·1	26	21·5 ± 3·6	2·5 ± 5·6	0·4
Insuffi. asthenica	7	5·8 ± 2·1	13	10·7 ± 2·8	4·9 ± 3·4	1·4
Insuffi. hysterica	4	3·3 ± 1·6	6	5·0 ± 2·0	1·7 ± 2·6	0·7
Oligophrenia	—	—	—	—	—	—

(6) *Peptic ulcer and mania.* ROSS, HAY, and MCDOWELL (1950) found a disproportionately large number of cases of mania amongst their mental hospital patients with ulcer. This is not supported by the present study.

(7) *Sequence of diseases.* The case records of the 121 patients with ulcer were inspected for evidence of a characteristic temporal sequence of the two conditions, ulcer and psychiatric disorder.

In all cases the ulcer preceded the mental illness by a longer or shorter period, and in some cases there were periodic exacerbations and remissions in one or both conditions. No tendency of the two conditions to coincide or to alternate was seen, though it should be remembered that in many cases the details available were so sparse that a positive result from the whole series could have appeared only if the tendency was very marked indeed.

(8) *Peptic ulcer and psychosis.* The view that peptic ulcer is relatively uncommon in a collection of psychotic patients is supported by this study (see Table 3). It has been shown that the inclusion of so many schizophrenics with their relatively marked immunity from ulcer is the reason for this finding. This low incidence of ulcer in schizophrenia may account for the low figure found by GREGG (1939) and SCHWARTZ (1951) for ulcer as the registered cause of death amongst mental hospital patients, as schizophrenics usually make up a large part of such a population. Taking all our cases of functional psychosis other than schizophrenia, there was an observed incidence of ulcer of 26, whereas amongst mentally healthy men of the same age between 25 and 32 would be expected. It therefore seems doubtful if psychosis as such has any bearing on the incidence of ulcer.

(9) *Peptic ulcer and neurosis.* The results indicate that patients who suffer from neurotic illnesses are unusually prone to peptic ulcer (see Table 3). Although neurotic depression shows by far the highest incidence of ulcer, all the other categories of neurosis show a small but consistent excess of ulcers over those expected in a mentally normal population.

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This problem has usually been approached from the opposite direction, i.e. investigation of the frequency of neurosis amongst patients with peptic ulcer. As has been seen, most studies depending upon the usual clinical diagnosis of neurosis have failed to show any significant association; however, in general the experiments were badly designed. Turning to studies that have utilized more refined techniques, some support for our results is to be found, but it must be noted that they refer more to the frequency of neurotic traits than to the incidence of neurotic illnesses. Thus, DAVIES and WILSON (1937) compared the personalities of patients with peptic ulcer with those of patients with hernia by means of CULIN and SMITH's (1930) inventory for the rating of chronic emotional stress and maladaptation. On a six-point scale, 90 per cent of the men with hernia were rated in the lower half (more placid) of the scale, while only 24 per cent of the men with ulcer fell in the same range. SMILEY (1955) found with the same inventory that accident-prone men were relatively stressed and maladapted, and that amongst them the incidence of ulcer was much higher than amongst the control series. RUESCH (1948) found his ulcer cases gave abnormal scores on the Minnesota Multiphasic Personality Inventory, although it is doubtful whether the population used as the standard of normality was strictly comparable. There are many other such studies in the literature, but in so far as the result is so much a function of the design of the inventory, they pose almost as many questions as they answer.

As a necessary consequence of the design of the experiment, all our cases suffered their neurotic breakdown after their ulcer by a longer or a shorter period. Although many cases had had their ulcer successfully treated years before their breakdown and although an attempt to detect a close temporal relationship failed, it still remains a possibility that the neurosis was caused by the ulcer. Some indirect evidence against this view is given by HAMILTON (1950), who used a personality inventory designed to discriminate between neurotics and normals; with it he found that duodenal-ulcer cases obtained scores similar to the neurotics, while gastric-ulcer cases were nearer the normals despite their very similar histories of abdominal pain. This suggests that neurotic traits are more a part of the individual constitution of the patient with duodenal ulcer, than a consequence of abdominal pain alone. On the other hand, KANTER and SANDLER (1955), using a questionnaire concerned with general symptoms of nervousness, found that neurotics with dyspepsia showed more in common with other patients with dyspepsia than they did with neurotics who did not have dyspepsia. The question must be left for the time being and must await positive evidence that ulcer pain does in fact contribute to the causation of neurosis.

The relationship of chronic anxiety and the development of ulcer is obscure. The present study contributes little useful information. In so far as chronic anxiety characterizes any neurotic individual, the results suggest a positive relationship; they fail to show that those neurotics in whom chronic anxiety is the most prominent clinical feature, and who are consequently diagnosed as suffering from an anxiety state, are the ones most prone to ulcer.

FORMULATION

Although the findings of this survey are of questionable reliability and require confirmation, it is thought worth while to present them in some conceptual framework. If it is assumed that the incidence of peptic ulcer is an index of the organism's vulnerability to environmental stress, then, in general, there is at the one extreme the withdrawn schizophrenic, and at the other the over-reactive neurotic; the former is relatively immune to ulcer and the latter is abnormally prone. Between these two extremes lie the other psychoses and the character disorders in which withdrawal from contact with the environment is less profound or less prolonged than it is in schizophrenia, and in which the incidence of ulcer is not very different from that amongst the mentally normal.

It also seems possible that the susceptibility to peptic ulcer is connected with susceptibility to depression. In this survey amongst the psychotics it is the depressives that are most prone to ulcer; similarly, amongst the neurotics it is in the depressives

that the incidence of ulcer is the highest. Clinically there are many connections: the depressive's waking in the early hours of the morning is reminiscent of the ulcer patient's night pain; depression is often experienced as coming in waves reminiscent of nausea and dyspepsia; in most depressed individuals there are perversions of appetite; in many anxious concern over gastro-intestinal function may proceed to delusions referring to food and the gut. In many studies of the psychology of depression, such as those of ABRAHAM (1942) and KLEIN (1940), oral activity is found to be of paramount importance; likewise in the psychology of alcoholic addiction there are prominent conflicts over oral dependency, and these patients are similarly prone to ulcer.

It is therefore suggested that proneness to peptic ulcer depends upon two factors: first, a general sensitivity to the environment shown to excess by neurotics and in default by schizophrenics, predisposing the individual to functional and structural disorders; and second, a tendency to, or capacity for, depression which carries with it a vulnerability of the gastro-intestinal tract. Such a formulation goes some way beyond the data available, but suggests further lines for investigation.

SUMMARY

(1) A total of 2068 male psychiatric patients were investigated for a history of peptic ulcer, and the results compared with findings in a similar survey of actively working men.

(2) After correction for age, the incidence of peptic ulcer was found to be lower amongst psychotics and higher amongst neurotics than in mentally normal men.

(3) The low incidence amongst psychotics was found to be almost entirely due to the very low incidence amongst schizophrenics.

(4) Amongst the neurotics the highest incidence was in those that were depressed.

(5) There is a high incidence of peptic ulcer amongst alcoholic addicts.

(6) There is a high incidence of peptic ulcer amongst patients suffering from asthma.

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BOOK REVIEWS

Sexual Offences: A Report of the Cambridge Department of Criminal Science. Macmillan & Co. Ltd., London, 1957, xxvii + 553 pp., 63s.

THE enquiries described in this report began in 1950, when the Cambridge Department of Criminal Science started a survey of sexual offences carried out in fourteen districts in England and Wales. The cross-section studied comprised about one third of all the indictable sexual offences recorded by the police throughout the country in 1947, and although sexual crime rose steeply, comparison with the figures in 1954 show that the study represents one fifth of the total crime. This rise in the number of sexual offences has been quite remarkable—between 1947 and 1954 the number of offences known to the police had risen from 9,018 to 15,636—an increase of 73 per cent. Clearly the subject matter of the book is of considerable importance to doctors, psychiatrists and sociologists, and to our own field of psychosomatic medicine. It is impossible in a review to do justice to the enormous mass of information which has been gathered together. This, together with the surveys by distinguished authorities, of legal practices with regard to sexual offences in Sweden, Norway, Denmark, Belgium and the United States, make this book essential, certainly for psychiatrists, and for the sociologically minded physician.

Some of the interesting data must be mentioned—for instance about one quarter of the homosexuals were married, over one third of the heterosexual offenders who were married were fathers of three or more children, and even among homosexuals this figure was quite considerable. Only about one tenth had had some sort of higher education; mental deficiency proved to be a considerable factor; in only one fifth of the total was a medical report placed before the Court. Punishment tends to be more lenient than formerly; and in 40 per cent only a fine was imposed; in a four year follow-up only one fifth of those who had been found guilty appeared before a court again charged with sexual offence. Such fascinating details can be found in every page of the book, which provides the factual, statistical background which is so necessary before proceeding to the study of the individual case. Much research on psychosomatic factors in criminals still waits to be done. An almost virgin field is waiting to be tilled. The basic data presented in reports such as this are invaluable precursors for a deeper, psychosomatic study of the problems of crime and criminals.

DENIS LEIGH

H. BRUCH: **The Importance of Overweight.** W. W. Norton & Co., Ltd., New York. x + 438 pp., $5.95.

ONE of the most remarkable things about that wonderful country the U.S.A. is the number of fat, really fat children to be seen. Still vividly remembered from my childhood days is the fat boy in the "Our Gang" pictures, and travelling in America later I was astonished to find his prototype everywhere from Boston to Albuquerque. Other countries have their famous "fatties," Billy Bunter has been a favourite with English children for many years, and is still going strong in a television series at the moment. HILDE BRUCH—coming from Germany—which is traditionally the home of beer and food-loving fat men and women, was startled by the number of really fat children she saw in New York when she arrived there in 1934. She determined to study obesity from then on, and this book is the result of her work to date. She is well known through her research publications, and her theory of obesity had the honour of being chosen as the subject of a Prize Essay at the University of Copenhagen in 1948. She is psychoanalytically trained, and a former director of the Children's

Psychiatric Services at the New York State Psychiatric Institute, although her work on obesity deals with adults as well as children.

In the period during which she worked, Dr. BRUCH points out that there has been a remarkable change in the medical approach to obesity. In the thirties it was fashionable to think in terms of endocrine disorder—and a misuse was made of FROELICH's description of a fat Viennese child, so that the Froelich syndrome was commonly diagnosed. She describes how she failed to find evidence of endocrine disorder, and was led to the study of psychological and social factors, to be followed by a psychoanalytic approach to fatness.

Dr. BRUCH describes her findings in detail, and gives a good review of the most important research done elsewhere. She delivers a scathing attack on the fallacies of the statistical approach—and illustrates it by quoting the work of FLEMMING QUAADE in Denmark—emphasizing that for her the clinical approach is supreme. Unfortunately this seems to me the basic defect of her book, for although there is still room for clinical studies, psychiatry and medicine can only truly progress by the use of scientific methods, the formulation of hypotheses, and the putting of these formulations to the test. Her work also suffers greatly from the selection of material—a difficulty encountered in the study of almost every psychosomatic disorder by the clinician functioning in the clinic or consulting room. In spite of these drawbacks, the book is well worth reading. It appears at a certain historical stage in the development of psychosomatic medicine. The case study, the differentiations of groups of fat people, the psychotherapy of fat people—all indeed interesting, but all in need of confirmation by the very statistical and research techniques to which Dr. BRUCH seems opposed, and which, pace Dr. BRUCH, the Danes so well understand. Clinical study must be the sketch out of which a full and correct picture is built. Dr. BRUCH has been the pioneer worker in this field of obesity and she has provided us with a brilliant sketch of her subject. The finished picture must be built up on the results of scientific research.

DENIS LEIGH

H. K. WELLS: **Pavlov and Freud. 1. Ivan P. Pavlov. Towards a Scientific Psychology and Psychiatry.** Lawrence and Wishart, London, 1956. 224 pp., 21s.

DR. WELLS has taken on a fascinating task in comparing and contrasting the work of FREUD with that of PAVLOV. The lives of the two men run concurrently—FREUD being born seven years after PAVLOV, in 1856, and died in 1939, three years after PAVLOV's death. Both men can truly be classed amongst the giants of medicine, both wrought a revolution in man's study of mental functioning, and both are linked with separate ideologies which now divide the world. The objective experimental approach followed by PAVLOV, and the introspective analytical approach of FREUD are as far apart as the political worlds of the East and the West. In the first of his projected two volumes, Dr. WELLS, at present a lecturer at the Jefferson School of Social Sciences in New York, describes the life, work and ideas of PAVLOV. In the second volume yet to come he will discuss the life and work of FREUD. This first volume is a good augury for the second, for although it is marred at times by hyperbole, Dr. WELLS tells a fascinating story clearly and well. PAVLOV's writings, and those of his followers, are, it must be confessed, often extremely dull and repetitious. Until comparatively recently his ideas have found little to recommend themselves to psychiatrists in the Western World, but a new wave of interest has arisen, probably linked with the rise to power of the Soviet Union. In France enthusiastic followers of Pavlovian theory abound, and in psychology these theories are being applied to clinical problems, albeit in a somewhat naive manner. Conditioning is fashionable; in spite of this however, PAVLOV's work does offer the possibility of an objective study of psychiatric illness and it behoves the research worker to acquaint himself with basic postulates. Dr. WELL's book is the best contemporary study of PAVLOV and his work, and as such will be greatly in demand. It also has the great advantage of being reasonably priced.

DENIS LEIGH

P. H. VAN LAER: **The Philosophy of Science**—I. Science in general, Duquesne Univ., Pittsburgh, U.S.A. $3.75.

THIS is the first of two parts of a book on the philosophy of science. It is concerned with "science in general" while the second part will be concerned with the division of the sciences and the proper nature of the more important groups of sciences. As a survey of the nature of science, the part under review here leaves a curious impression. The author clearly has read widely and, as a practising scientist (Dr. VAN LAER is known for his research on caloric properties in super-conductors) what he has to say is worth listening to. On the other hand, there is a curious religious–Thomistic bias to his book which is quite unusual. Few books of this kind will try to fit religion into the scheme of sciences (p. 45) or discuss proofs for the existence of God (p. 158). As might be expected, the modern discussions of the nature of science are not dealt with at all; there are references to Albert the Great, Aristotle, and Aquinas, but none to Carnap or Bridgman. Much of what the author has to say is true and valuable if only because the classical notions of scientific method have in them much that is true and valuable. As a guide to modern thinking on the subject, however, this book cannot be recommended.

H. J. EYSENCK

Extrasensory Perception: Ciba Foundation Symposium. Edited by G. E. W. WOLSTENHOLME and E. C. P. MILLAR. J. and A. Churchill, Ltd. 240 pp., 27s.6d.

ABOUT two dozen participants attended the Ciba Symposium on Extrasensory Perception in May 1955, and this volume presents the papers read as well as the extensive discussion which followed the papers. It is a little difficult to know quite to whom this book is addressed; to those knowledgeable in the field there would be little that is new by way of fact or argument; to those who approach it for the first time the lack of detail and the assumption of familiarity with certain classics would be a definite handicap. Almost inevitably, therefore, the book falls between two stools, but this does not, of course, prevent many sections from being of considerable interest; indeed, this is almost inevitable in view of the eminence of the participants. Arguments between SPENCER BROWN and S. G. SOAL on the statistical evaluation of experiments in this field, or between MATTHEWS and PRATT on bird navigation and homing are worth reading even if little new is said.

The very detailed report of the discussion which followed the papers has all the fascination of gossip, although it is doubtful whether the talk really ever settled anything or got beyond the level of a good after-dinner conversation. It does illustrate beautifully how even great minds can find it difficult to keep to the point, to avoid red herrings, and to stick to the simple rules of logic. Altogether, then, the book is enjoyable but not an original contribution to knowledge.

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